

C I T Y O F R I V E R S I D E

PUBLIC UTILITIES DEPARTMENT
WATER DIVISION

SPECIFICATION NO. 205
FOR THE DESIGN AND INSTALLATION
OF WATER DISTRIBUTION SYSTEMS

By
WATER ENGINEERING DIVISION
October 1988

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Roadbed	-	That portion of the street included between the outside lines of curbs or paving.
Soils Engineer	-	The Soils Engineer as referred to in the Grading Ordinance.
Standard Plans	-	Standard Detail Drawings of the Engineering Section of the Public Utilities Department, Water Division, of the City of Riverside, which drawings are also referred to as Standard Drawings.
Surface Course	-	The top layer of pavement (exclusive of open graded A.C.), designed to provide structural values and a surface resistant to traffic abrasion.
Traveled Way	-	That portion of the roadway reserved for the movement of vehicles for the general public, exclusive of shoulders and auxiliary lanes. Where traffic has been diverted or restricted to certain lanes, with the approval of the Traffic Engineer, these diversions or restricted lanes become the traveled way.
Right-of-Way	-	Includes City of Riverside Public Right-of-Way and City of Riverside Public Easements.

1-3

ABBREVIATIONS

1-3.2

Common Usage

Ah.	Ahead
A.V.	Air Valve
B/B	Bell by Bell
B.F.V.	Butterfly Valve
Bk.	Back
B.O.	Blow Off
B/S	Bell by Spigot
C	Caulked
Cad.	Cadmium
C.C.	Corporation Cock
C.M.L. & C.	Cement-mortar lined and coated
Cplg.	Coupling
C.T.	Compound Turbine
C.T.F.	Cut to Fit
D.I.P.	Ductile Iron Pipe
Elec.	Electrical
Ell	Elbow
F/B	Flange by Bell
F/F	Flange by Flange
Flg.	Flange or Flanged
F.P.T.	Female Pipe Thread
F/S	Flange by Spigot
G.	Gas line or service
gpm	Gallons per minute

G.V.	Gate Valve
H.P.I.	Horizontal Point of Intersection
I.P.F.	Iron Pipe Female
I.P.M.	Iron Pipe Male
I.P.T.	Iron Pipe Thread
L.D.	Loop Detector
M.H.T.	Male Hose Threads
M.L.&C.	Mortar Lined and Coated
N.R.S.	Non-Rising Stem
O.O.	Out to Out
O.S.Y.	Outside Screw and Yoke
Perp.	Perpendicular
P.P.M.	Parts Per Million
P.T.	Pipe Threads
R.W.	Resilient Wedge
S.	Sewer main or house lateral
St. Lt.	Street Light
S.W.	Sweat Weld
S.W.P.	Standard Working Pressure
t	Thick
U.G.	Underground
V.P.I.	Vertical Point of Intersection
w/	With
W.	Water Main or Service
W.O.	Work Order

1-3.3 Institutions

C.R.S.I.	Concrete Reinforcing Steel Institute
C.W.D.	City Water Division
P.W.D.	Public Works Department
S.S.P.W.C.	Standard Specifications for Public Works Construction

All institution publications shall be the latest edition unless otherwise shown on the construction drawings, standard drawings, or these specifications.

Abbreviations shown on Public Works Department Standard Drawings, and Public Works Department Standard Drawing No. 1 also apply.

1-4 SYMBOLS

Symbols shown on Plans, Water Division Standard Drawings, and Public Works Department Standard Drawing No. 1 also apply.

SECTION 2 - SCOPE AND CONTROL OF THE WORK

2-1 AND 2-2 Deleted

2-5.1 General

The work embraced herein shall be done in accordance with the provisions of the STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (1988 Edition), prepared by the Southern California Chapter of the American Public Works Association and Southern California Districts Associated General Contractors of California, insofar as the same may apply, which specifications are hereinafter referred to as the Standard Specifications, and as provided herein.

Should any discrepancy or apparent error occur in Plans and Specifications or should any work of others affect this work, the Contractor shall notify the Private Engineer at once. If the Contractor proceeds with the work affected without instructions from the Private Engineer, he shall make good any resultant damage or defect.

2-5.2 Precedence of Plans and Specifications

In the event of any discrepancy between any drawing and the figures written thereon, the figures shall be taken as correct. Detailed drawings shall prevail over general drawings.

2-5.3 Shop Drawings

Shop drawings need not be reproducible. A minimum of four copies will be submitted to the Engineer for approval.

2-5.4 Plans

Plans shall be submitted for approval by City, and shall bear the signature of the Engineer. The project location, nature, size, extent, form and detail of its various features shall be shown on the Plans prepared by the Private Engineer.

2-5.5 Certification

Written test certifications on valves, pipe or mechanical equipment shall be submitted to the City at the preconstruction conference as required per Part 3 prior to installation. Maintenance manuals, parts list and related drawings shall be submitted prior to acceptance by City.

2-9 SURVEYING2-9.5 Line and Grade

Flagged stations and elevations shown on the Plan will be staked by the Private Engineer. Survey staking will only be required for alignment and stationing of fittings, valves and other appurtenances. Contractor shall lay pipe and appurtenances to all points shown on the grade sheet. Existing curb and gutter shall be used for grade measurements, unless the Contractor has obtained written approval from the Engineer for grade staking prior to the construction of curb and gutter. Grade stakes shall be set at 25-foot intervals.

When the AQMD predicts that a Stage III episode level will be reached the following day, an announcement containing the specifics will generally be provided by 2:00 p.m. on the day the prediction is made.

6-8 COMPLETION AND ACCEPTANCE

6-8.1 One-Year Guarantee

The Contractor shall be responsible for and guarantee the maintenance of all workmanship and materials for a period of one year following the completion and final acceptance by the City. Any defective labor and materials furnished in the performance of the work shall be repaired or replaced immediately. The Engineer may elect to repair or replace the defective work by the use of City forces or any other methods, if Public Safety is endangered.

SECTION 7 - RESPONSIBILITIES OF THE CONTRACTOR IN THE CONDUCT OF HIS WORK

7-3 LIABILITY INSURANCE

The liability insurance policy or policies shall contain the following provisions:

- (1) Comprehensive Form
- (2) Coverage of owned and non-owned automobiles.
- (3) Premises - Operations
- (4) Broad form property damage in any case where the Contractor has any property belonging to the City in his care, custody or control.
- (5) Owners and Contractors protective liability.
- (6) Blanket contractual liability.
- (7) Independent Contractor.
- (8) Products and completed operations coverage.
- (9) Underground Hazard
- (10) An endorsement containing the following provisions:

"Solely as respects work done by and on behalf of the named insured for the City of Riverside, it is agreed that the City of Riverside is added as an additional insured under this policy. It is further agreed that the other insurance conditions of the policy are amended to conform therewith."

No work shall be started within the right-of-way until the Contractor has obtained all necessary permits. The Contractor shall submit to the City at the Preconstruction Conference a copy of the required City Public Works Department, Street Opening Permit, and a State Excavation Permit, if applicable. Contractor shall be licensed in accordance with the Business and Professions Code. He shall have a Class A (General Engineering) or Class C-34 (Pipeline) Contractors license. The Contractor shall obtain and pay for all permits and fees and give all notices necessary and incidental to the due and lawful prosecution of the work and to the preservation of the Public Health and Safety.

7-5.1 Licenses

The Contractor shall obtain at his expense all licenses necessitated by his operations. Prior to starting any work, the Contractor shall be required to have a City of Riverside Business Tax Registration valid for the life of the contract. His subcontractors shall also have registrations valid for the time they are engaged in the work.

7-10PUBLIC CONVENIENCE AND SAFETY

The Contractor shall obtain written approval from the City Traffic Engineer for variances from the traffic provisions of this section.

7-10.1 Traffic and Access

In general, the following traffic and access control measures will be required:

- (a) No reduction of the roadway width shall be permitted before 8:30 a.m. nor after 4:00 p.m. on any major street.
- (b) A minimum of two 12-foot lanes (one for each direction of travel) shall be maintained at all times. When such lanes are not possible during working hours, the Contractor shall provide and maintain one lane for through traffic with a minimum of two flagmen.
- (c) The Contractor should avoid starting a new project on a Friday or before a holiday if his work will restrict traffic flow.

7-10.2 Storage of Equipment and Materials in Public Streets

Approval must be obtained from the Traffic Engineer to store equipment or materials within the roadway.

7-10.3 Street Closures, Detours, Barricades

The Contractor will be required to get approval for signing and barricading from the City's Traffic Engineer prior to starting any operation which will interfere with the normal flow of traffic.

For convenience to the Contractor in complying with the other provisions of Subsection 7-10.3, the following telephone numbers are listed.

Fire Department782-5321
Police Department787-7912

Traffic Engineering Division.....	782-5366
Traffic Signal Division	782-5576
Goodhew Ambulance Service.....	684-5520
RTA.....	684-0850 (if applicable)
Street Superintendent.....	782-6127
Riverside Schools.....	788-7132
Alvord Schools.....	351-9367 (for bus lines)
Special Services Transportation..	782-6138

If the above telephone numbers are changed, the Contractor is not relieved of his responsibility of notifying the various departments.

Construction signs, barricades, and their applications shall conform with the most current issues of the State of California Business and Transportation Agency, Department of Transportation, Division of Operations "Uniform Sign Chart" and the "Manual of Traffic Controls" for Construction and Maintenance Work Zones and the City of Riverside Public Works Department Standard Drawing No. 658.

7-10.4.2 Use of Explosives

Blasting permits shall be obtained from the Police Department.

7-10.4.4 Public Safety During Non-Working Hours

Notwithstanding the Contractor's primary responsibility for safety on the job site, when the Contractor is not present, the Engineer at his option after attempting to contact the Contractor may direct City forces to perform any functions he may deem necessary to ensure public safety at or in the vicinity of the job site. If such procedure is implemented the Contractor will bear all expenses incurred by the City.

In all cases the judgment of the Engineer shall be final in determining whether or not an unsafe situation exists.

7-16 FLOOD HAZARDS AND DRY WEATHER FLOW

Special attention is directed to possible flood hazards and/or nuisance water such as irrigation and other runoff. The Contractor shall be responsible for all injuries or damages to any portion of the work occasioned by the above causes and he shall make good such injuries or damages at no cost to the City prior to the completion and acceptance of the work.

SECTION 8 - FACILITIES FOR AGENCY PERSONNEL

8-1 GENERAL

Facilities for agency personnel will not be required.

SECTION 10 - TELEPHONE

10-1 TELEPHONE

The Contractor shall maintain a telephone where he or his responsible agent may be reached at all hours during the day or night for emergencies. The number will be given to the Water Inspector, Police, Public Service, Traffic, Public Works and any other necessary parties.

PART 2 - DESIGN CRITERIA

2-1

GENERAL

2-1.1 Standards The water system addition or extension shall be designed in accordance with the City of Riverside Water Division Master Plan, Specification No. 205 - Water Distribution System and the Standard Drawings. This specification is intended for developer-installed water lines 12-inch and smaller. Developer shall contact the Water Engineering Division regarding irrigation line relocation and replacements and other water facility design and construction.

2-1.2 Alternates The design shall take into consideration physical conditions known to exist at the time and place of each installation and the probable operating requirements. Where such conditions render sections of these Specifications inapplicable, alternate methods of design may be submitted to the Engineer, and upon approval thereof, may be incorporated in the Plan.

All flows shall be computed on the basis that the area served by the extension or addition is completely improved to limits imposed by its present zoning or the zoning required to allow construction of the proposed development.

Design flow will be the greater flow produced by either..

- (1) Maximum day domestic demand plus required fire flow, or:
- (2) Maximum hourly domestic demand on days of maximum demand.

2-3

WATER SYSTEM PLANS

2-3.1 General Plans and Specifications for all additions and extensions to the Water Distribution System of the City of Riverside shall be prepared in strict accordance with these Standards and Specifications, under the direction of a Civil Engineer, licensed in the State of California.

The Plan shall include drawings and descriptive information in sufficient detail to clearly indicate type, kind, size, physical properties, arrangement, and operation of component materials and devices, external connections, anchorages and supports required, and dimensions needed for installation and correlation with other materials and equipment. Cover sheet shall include an index map showing a schematic of the proposed improvements.

2-3.2 Procedure Two (2) copies of each drawing and all necessary subsequently requested data shall be submitted to the Engineer for Plan Check.

When Plans are returned "red lined" to the Private Engineer, the corrections shall be made as noted thereon and two (2) copies resubmitted to the Engineer along with the "red lined prints."

When Plan Check has been completed, the original Plans shall be submitted for Engineer's signature. The original shall then be furnished to the Public Utilities Water Division for the permanent records. Plan checking will not proceed until the appropriate plan checking fees are paid to the Utility Services Section of the Public Utilities Department.

2-3.3 Responsibility The Engineer's review of Plans and Engineering data will cover only general conformity of the design with the Standards and Specifications outlined herein. The Engineer's approval of Plans and Engineering data will not constitute a blanket approval of all dimensions, quantities, physical properties, materials, equipment, devices, or items shown, and does not relieve the Private Engineer from any responsibility for errors, deviations, or defects in design thereof.

2-3.4 Plan Preparation The Plans shall be prepared as follows:

2-3.4.1 Plan Size The Plans shall be prepared on linen or 4 mil mylar sized to 22" X 34" or 24" X 36" with a City of Riverside, Department of Public Utilities title block. Direct photo mylar copies will be accepted. Signature blocks for Water, Electric, Public Works (if required), Fire Prevention and the Private Engineer shall be added to each sheet adjacent to the title block as required at Plan Check. The Private Engineer's seal shall be affixed to the plans prior to first submittal.

2-3.4.2 Base Map The base map shall be drawn to scale of 1" = 40' showing property lines, street centerlines, existing and proposed underground utilities, and streets adjacent to the Tract or Development.

2-3.4.3 Layout The Plans shall show the general layout, location size, type and class of mains, hydrants, valves, services, and other pipeline appurtenances.

References shall be made to Standard Drawings and Specifications contained herein.

Centerline of valves, hydrants tees, services, and special fittings or bends, shall be laid to scale on the base map. Alignment and grades shall be calculated and shown where necessary to clear interferences and/or maintain minimum radii.

2-3.4.4 Profile In general, profile drawings and profile grades will not be shown for lines smaller than 12 inches in diameter. However, where construction involves numerous grade changes to avoid conflicts with sewers, sewer house connections, storm drains or other buried interferences, or in unimproved areas, easements or areas without curb and gutters, the Engineer may require profiles clearly showing critical clearances and cuts from proposed finished grade. The Survey Bench Mark must be included with any plan that has profile elevations on it.

2-3.4.5 Survey Data The Plan shall clearly show sufficient survey data to enable the construction and alignment of all water lines shown thereon.

- (1) Stations for valves, tees, 2 inch diameter and larger services, special fittings, BC and EC of curves, angle points, locations of conflicts with sewer or storm drains shall be calculated consecutively along the pipeline.
- (2) The gate valve at the tie-in to the existing system shall be stationed 0 + 00.

- (3) Equations shall be used at pipeline intersections.
- (4) Bearings shall be shown on all straight sections. Basis of bearings shall be included.
- (5) The radius, tangent, length of curve, and interior angle of all curves shall be shown.
- (6) Right angle distances from centerline of pipe to street centerline shall be shown.

2-3.4.6 Bill Of Materials Materials list showing the size and number of specials, fittings, valves, length of pipe by diameter, class, type, and thrust bearing area of fittings shall be shown.

2-3.4.7 Legend A legend clearly specifying all materials used in construction, using the symbols shown on Standard Drawing No. CWD-010-1 and 2 shall be shown on the first sheet of each set of Plans.

2-3.4.8 General Notes General notes and drawing numbers will be given to the Private Engineer at the first Plan Check.

2-3.4.9 Tie-Ins Connection to the existing water main shall be made by City Forces. The location and limits of such work shall be shown on the Plans.

2-3.4.10 Calculations and Supplementary Information Calculations and supplementary information shall be submitted to the Engineer as required.

2-3.5 Revisions The City will release the original plans to a bonded carrier for reproduction of a mylar transparency. The Private Engineer shall then pick up the originals, in exchange for the duplicate mylar, and revise the originals pursuant to Subsection 2-3.2.

2-4 DISTRIBUTION MAINS

2-4.1 General Layout The general layout of the system shall be similar to that shown on Standard Drawing No. CWD-010-1 and 2. The system shall be designed as a circulating grid with at least three (3) main line valves at each four way intersection. Each line shall be gated so that any segment not exceeding one block (500+ feet) or two fire hydrants of the system may be isolated from service. Permanent dead ends over 300 feet in length shall have circulating ties on 20 foot easements through side lot lines. Dead end mains shall be provided with means of flushing with a blow-off.

2-4.2 Pipe Material Distribution system piping shall be constructed of Asbestos Cement Pipe, or Ductile Iron Pipe conforming to these Specifications.

All pipe material utilized within public utility easements shall be D.I.P. or C.M.L. & C. steel pipe, with the exception of those easements extending through paved private roadways.

2-4.3 Pipe Strength Minimum pressure class pipe or thicknesses class will be determined as follows:

2-4.3.1 Pressure Internal pressures shall be calculated from the maximum working pressure expected on the pipe. No allowance need be made for water hammer in distribution system analysis. Pumping suction and discharge lines shall be investigated as to water hammer under conditions of power failure at full flow. In general, pressures for each zone may be calculated from the following table:

<u>PRESSURE ZONE</u>	<u>ELEVATION OF MAXIMUM WATER SURFACE</u>
925'	975'
Gravity (997)	1000'
1010'	1060'
1040'	1090'
1100'	1150'
1200'	1250'
1300'	1350'
1400'	1450'
1600'	1650'

For pressure zones other than those listed, contact Water Engineering for the elevation of the maximum water surface.

2-4.3.2 External Loads Pipelines shall be designed to withstand the weight of the earth cover plus loading determined from application of an H-20 truck load using appropriate impact factors which recognize depth of pipe.

2-4.3.3 Pressure Class The pressure class of pipe and fittings shall exceed the maximum working pressure expected in the system. Minimum pressure classes are as follows:

- (1) Asbestos Cement Pipe - Class 150
- (2) Ductile Iron Pipe - Thickness Class 51 for 4" Diameter
Class 50 for 6" Diameter and larger
- (3) C.M.L. & C. Steel Pipe - Working water pressure 150 psi

2-4.4 Pipe Sizing The Water Division will size the mains for the Engineer on return of the first Plan Check in general conformance to the following:

2-4.4.1 Commercial and Industrial Districts In commercial and industrial districts the standard minimum size shall be 12" diameter. The zoning designations for commercial districts are (per Riverside Planning and Building Department), RO, P, CO, C-1, C-1-A, CL, C-2, C-3 and C-4. The zoning designations for industrial districts are YS, MP, M-1, M-2, WC, RWY and AIR.

2-4.4.2 Residential Districts In residential districts the standard size shall be 8" diameter; 6" diameter pipe to be used only where it completes a grid of less than 600' on a side.

2-4.4.3 Minimum Size The minimum size main in the residential distribution system shall be 4" diameter D.I.P. in cul-de-sac streets serving not more than 10 services. Minimum pipe size for any branch used for fire hydrant supply shall be 6" except as noted in 2-4.4.1.

2-4.5 FLOW REQUIREMENTS

2-4.5.1 Residential Demands Residential demands for system additions serving up to 400 residential units may be calculated from the formula $Q = NCF$, where Q = Maximum hourly flow in gpm; N = number of units served; $C = 5.0$; & F = a diversity factor which may be interpolated from the following table:

N (number of Units)	F (diversity factor)
4	2.0
10	1.8
50	1.0
100	0.7
200	0.5
400	0.4

For developments of more than 400 units, peak flow requirements will be developed from Water Division records.

2-4.5.2 Commercial and Industrial Commercial and industrial flows shall be determined by the Water Division.

2-4.5.3 Fire Flow Specific fire flow requirements shall be determined by the Water Division using recommendations of the fire department servicing the area. Fire flows for most areas will generally fall within the following limits:

(1) Single family residence	1000-2000 gpm @ 20 psi min.
(2) Multiple Residential & Condominiums	1500-3500 gpm @ 20 psi min.
(3) Commercial	2500-7000 gpm @ 20 psi min.
(4) Industrial	2500-6000 gpm @ 20 psi min.

Fire flows may be considered as flowing from 3 adjacent hydrants in residential zones. For Commercial and Industrial zones, use all hydrants within 500' of fire location.

2-4.5.4 Demand Location Fire flows will be taken from the most remote hydrant or group of hydrants. Simultaneous domestic demands may be apportioned and taken from each junction in the grid.

2-4.5.5 Velocities Pipeline velocities shall be maintained at 5 feet per second or less at maximum hourly flows in the grid system. For pipelines under fire flow plus maximum day domestic demands, velocities may not exceed 10 feet per second.

2-4.6 Pipe Location Water mains shall be located 8 feet south and 8 feet west of street centerline. The location may only be changed upon approval of the Engineer.

2-5.1 Curbs A minimum of 3-1/2 feet clearance shall be provided between centerline of pipe and back of curb at straight sections. Where curb curves, 4 feet clearance shall be provided.

2-5.2 Sewers Sewer Pipe and Water Main conflicts shall be governed by the following rules.

2-5.2.1 General

- (1) Installation of sewer pipe and water main in the same trench is prohibited.
- (2) Parallel sewer pipe and water mains shall be located as far apart as practicable. The standard horizontal separation shall be 10 feet out to out (O.O.).
- (3) Horizontal separation of less than 10 feet (O.O.) but greater than 5 feet (O.O.) requires the approval of the Engineer, and the use of special construction methods outlined herein. Horizontal separation of less than 5 feet (O.O.) for gravity sewers and 10 feet (O.O.) for sewer force mains is prohibited.
- (4) Where the water main crosses over the sewer, the standard minimum vertical separation is 3 feet (O.O.). Vertical separation of less than 3 feet (O.O.) or sewer crossing over the water main requires the approval of the Engineer and the use of special construction methods outlined herein. A water main crossing within 1 to 3 feet O.O. of a sewer force main shall also require the approval of the State Health Department. Sewer laterals, or mains, located within 12" O.O. of water mains are prohibited.
- (5) All separations referred to in these Specifications are horizontal or vertical distances measured at right angles to the water main. Crossing at less than 45° will not be permitted.
- (6) Details of water main-sewer pipe conflicts involving special construction methods for greater than 12" diameter pipelines shall be shown on the Plans.
- (7) Where sewer is referred to in these Specifications and Drawings it shall be interpreted as sewer main or sewer lateral. (This applies to drawings CWD-020, CWD-021, CWD-022, CWD-023, CWD-024.)
- (8) When a new sewer force main crosses under an existing water main, all portions of the sewer force main within ten feet (horizontally) of the water main shall be enclosed in a continuous pipe casing, per CWD-023, Type A.
- (9) When a new water main crosses over an existing sewer force main, the water main shall be constructed of pipe materials with a minimum rated working pressure of 200 psi or equivalent pressure rating.

2-5.2.2 Standard Drawings Standard Drawings No. CWD-020 to CWD-024 inclusive provide detailed instructions for conflicts involving sewer pipe and water main. The following definitions of terms apply to said drawings:

- (1) Standard Drawing No. CWD-021 (Water Main Under Sewer).
 - (a) "Encase sewer pipe" denotes either asbestos cement pipe, vitrified clay pipe, or reinforced concrete pipe each installed in 1/4" thick steel casing per Type A, Standard Drawing Number CWD-023, or reinforced concrete encasement per Type B of said drawing.
 - (b) "Encase Water Main" denotes plain encasement per Type C of Standard Drawing Number CWD-023.
- (2) Standard Drawing No. CWD-022 (Water Main Over Sewer).
 - (a) "Install D.I.P. Water Main" denotes installation of ductile iron pipe per A.W.W.A. C-151 minimum pressure Class = 150 psi.
 - (b) "Encase Sewer Pipe" denotes encasement per Type C of Standard Drawing Number CWD-023.

2-6 THRUST BLOCKING

2-6.1 Location Concrete thrust blocks, bearing against undisturbed soil, will be located at bends, ells, tees, gate valves, reducing sections, outlets and dead ends, wherever required to resist unbalanced forces due to water pressure. The location will be clearly noted on the Plan.

2-6.2 Size Thrust blocking size shall be computed using the pressure classification of the pipe plus an additional one-third of the pressure for water hammer allowance. Unit soil pressures may be taken at 2000 pounds per square foot unless special conditions warrant otherwise. Thrust block sizes are given in Standard Drawing No. CWD-030 for 150 psi and 200 psi pipe, utilizing the above criteria.

2-7 VALVES

2-7.1 Location The location of valves shall be shown and stationed upon the Plan.

2-7.2 Outlet and Appurtenant Valves Valves shall be placed at all outlets, hydrant, blow-off, air valve and service connections as shown on the Standard Drawings. Dead end valves placed for future extensions shall be suitably capped or plugged.

2-7.3 Size Valves will be the same size as the diameter of the line in which they are installed.

2-7.4 Type Line valves shall be gate valves conforming to all applicable A.W.W.A. Specifications and the Specifications outlined in Part 3. Pressure designation shall be the pressure class of the pipe.

2-8.1 Location Distribution of fire hydrants shall be based upon the required fire flow, the average area protected not to exceed that given in the following table:

<u>Required Fire Flow</u> (gpm)	<u>Average Area Per Hydt.</u> (Square feet)	<u>Maximum Spacing</u> (feet)
1000 or less	160,000	450
2000	140,000	400
3000	120,000	350
4000	100,000	350
5000	90,000	350
6000	80,000	300

Hydrants shall be placed at such evenly spaced intermediate locations which provide the required coverage. Design consideration shall be taken in locating hydrants at intersections wherever possible. Near service area limits and in sparsely settled areas, maximum distance from hydrant to any habitable buildings shall be 450 feet. Nearest offsite hydrants to each tie-in shall be shown or indicated.

Hydrants shall be set so that they are easily accessible to fire department pumpers. Locations in depressions, cut outs, or on embankments high above the street are not acceptable. Hydrant locations are subject to the review and approval of the Fire Chief. A signature block for the Fire Prevention Chief is required on the Plans.

2-8.2 Size Hydrants shall be 6 inch wet barrel type A.W.W.A. C-503, with one 4 inch and one 2-1/2 inch outlet with 6 inch ductile iron bury.

Super hydrants for commercial and industrial districts shall have two (2) 2-1/2" outlets and one (1) 4" outlet.

2-9.1 Location Each service shall be shown upon the Plan at the approximate center of each lot. Reference distance and pipeline stationing shall be noted upon the Plans. The Private Engineer shall give due consideration to proposed improvements by others (i.e., driveways, catch basins, pullboxes and sewer laterals).

2-9.2 Size Services and meters shall be sized in accordance with the provisions of Section 1009 of the Uniform Plumbing Code, using minimum pressures expected in the system. Minimum service pipe diameter and meter size shall be: 1" line and 5/8" Meter.

2-9.3 Meter Setting All meters will be set by City Forces. The Contractor will lay the service to and including the meter stop, meter spacer and the meter couplings, and set the meter box. Meter spacers will be provided by the City. Pipe ends will be suitably covered to prevent entrance of foreign matter into the service lines.

2-9.4 Meter Vaults

All vaults for water and fire services 3 inches and greater shall be shown in a separate detail on the design plans. The detail shall show location and distances to driveways, curb and gutter, sidewalks, structures and utilities within 10 feet of the meter vault. Both sides of the vault shall be stationed in the detail, with all structural calculations provided for vaults located in traffic areas.

2-10 BLOW-OFF ASSEMBLIES

2-10.1 Location Blow-off assemblies installed as per Standard Drawing No. CWD-411 or CWD-411-1 will be constructed at the termination of all dead end mains. If special conditions so warrant, additional blow-off assemblies will be installed at low points in the water main.

2-10.2 Size Blow-off assemblies will be constructed of 2" diameter piping and valves per Standard Drawing No. CWD-411 or CWD-411-1 unless special conditions warrant larger diameter installations.

2-11 AIR VALVES

2-11.1 Requirements Air and vacuum valve installation will not normally be required in water system extensions and additions. If in the opinion of the Engineer, special conditions so warrant, air and vacuum valves will be installed at the developer's expense.

2-11.2 Location Air and Vacuum Valves, when required, will be located at high points in the distribution system or on the downhill side of gate valves located at the high end of long uphill runs of pipe.

2-11.3 Size Air and vacuum valve sizes will be calculated on the basis of replacing water evacuating to atmosphere through an orifice corresponding to main line diameter, utilizing the head available, less friction, between the valve and the lowest line point. Differential pressure across the air valve will be limited to a minimum of 5 psi.

PART 3 - CONSTRUCTION MATERIALS

All as provided in Part 2 of the Standard Specification for Public Works Construction, except as modified herein.

SECTION 201 - CONCRETE, MORTAR, AND RELATED MATERIALS

201-1 PORTLAND CEMENT CONCRETE

201-1.1.3 Concrete Specified by Compressive Strength

Mix designs with more than 45% of fine and coarse aggregate shall not be permitted.

201-1.6 Prepackaged Cement-aggregate Mix

Prepackaged cement-aggregate mix shall not be allowed.

SECTION 203 - BITUMINOUS MATERIALS

203-6.9 Asphalt Types for Various Uses

The materials listed below shall be used unless otherwise provided by permits from other agencies or the Plans.

Blast furnace or steel slag is not acceptable as an aggregate in asphalt concrete.

<u>TYPE</u>	<u>USE</u>
B-AR-4000	- Base course for streets
C2-AR-4000	- Base course for alleys and trench resurfacing;
	- Base course for streets with grades over 10%;
	- Surface course for streets, alleys and trenches.
D2-AR-16000	- Berm
E-AR-4000	- Hand raking in inaccessible areas and feather-edging.
D2-AR-4000	- Overlay less than 1" thick

SECTION 207 - PIPE

Section 207 - Unless otherwise specified herein, pipe of the Standard Specification is deleted in its entirety.

CONSTRUCTION MATERIALS FOR
WATER MAINS AND APPURTENANCES

The following Sections shall be used in the construction of water mains and appurtenances.

3-0 GENERAL

All affidavits of compliance and certifications referenced herein shall be addressed to the City of Riverside, identify the item supplied, and specify the project or plan number for which the material is being supplied.

3-1 ASBESTOS CEMENT PRESSURE PIPE

3-1.1 General

These specifications apply to asbestos cement pressure pipe. All asbestos cement pipe shall be Class 150 unless otherwise shown on the plans and shall meet the requirements of A.W.W.A. C-400, Type II and A.S.T.M. C-296, Type II.

3-1.2 Certifications by Manufacturer

The manufacturer shall submit a sworn statement that the pipe furnished has been sampled, tested and inspected in accordance with these Specifications and that the results thereof comply with the requirements of these Specifications.

3-1.3 Inspection and Testing

Inspection in the plants shall be by the manufacturer. Testing to insure compliance with these Specifications shall be made in accordance with A.W.W.A. C-400 within the Continental United States at the last point of loading on rubber tired vehicles before delivery to the job site.

3-1.4 Couplings

Each length of pipe shall be furnished with a coupling of an asbestos cement sleeve manufactured by the same manufacturer of the pipe and two (2) rubber rings. The couplings shall be designed so as to insure a water-tight joint with the pipe.

The rubber rings shall be of a type recommended by the pipe manufacturer, shall be compatible with the pipe and coupling and shall conform to A.S.T.M. D-1869 "Rubber Rings for Asbestos Cement Pipe."

Tapped couplings or service saddles shall be used for all pipe connections 2 inches or less. Tap couplings shall have a brass insert extending full wall thickness into the coupling and shall have (AWWA Corporation stop inlet) C.C. threads.

3-1.5 Fittings for Asbestos Cement Pipe

This section covers all fittings required for bends, tees, crosses, reducers, plugs, caps, fire hydrant burys and connections to mainline valves shown on the plans. Burys and spacer spools shall not have break-off grooves.

All fittings shall have a minimum pressure rating of 250 psi and shall be manufactured per A.N.S.I. A21.10/AWWA C-110 for "push-on joint" dimensions with end fittings per AWWA C-400, Appendix A. Ductile iron compact fittings conforming with A.N.S.I. A21.53/AWWA C-153 may be used to clear obstructions when approved by the Engineer.

Ductile iron fittings shall be cement mortar lined per A.N.S.I. A21.4/AWWA C-104.

3-1.6 Approved Pipe Manufacturers

- (a) JM Manufacturing Corporation
- (b) Certain-Teed Products Corporation
- (c) Certified Pipe Products

3-1.7 Approved Fittings Manufacturers

- (a) Pacific States Cast Iron Pipe Company
- (b) Tyler Pipe
- (c) Dayton
- (d) Clow
- (e) Trinity Valley
- (f) Reliable

3-2 DUCTILE IRON PIPE

3-2.1 General

These specifications apply to ductile iron pipe for water transmission and distribution. All ductile iron pipe shall be thickness Class 50 unless otherwise shown on the plans and shall meet the requirements of ANSI A21.51/AWWA C-151.

3-2.2 Certification by Manufacturer

The manufacturer shall submit a sworn statement that the pipe furnished has been sampled, tested and inspected in accordance with these Specifications and that the results thereof comply with the requirements of this Specification.

3-2.3 Inspection and Testing

Inspection in the plant shall be by the manufacturer. Copies of all test reports shall be submitted to the Engineer.

3-2.4 Joint Type

Ductile iron pipe and fittings shall have one of the following joint types as shown on the Plans or Standard Drawings.

- (a) Mechanical joint A.N.S.I. A21.11/AWWA C-111
- (b) Rubber gasket push-on joint - A.N.S.I. A21.11/AWWA C-111
- (c) Flanged joint - A.N.S.I. A21.10/AWWA C-110

3-2.5 Lining and Coating

Ductile iron pipe and fittings shall be lined with cement mortar per A.N.S.I. A21.4/AWWA C-104. The coating shall be a bituminous coating with a minimum of 1 mil in thickness.

3-2.6 Fittings for Ductile Iron Pipe

This section covers all fittings required for closures, bends, tees, crosses, reducers, plugs, caps, blow-offs, fire hydrant burys and connections to mainline valves shown on the Plans.

All fittings shall have a minimum pressure rating of 250 psi and shall be manufactured per A.N.S.I. A21.10/AWWA C-110.

3-2.7 Approved Pipe Manufacturers

- (a) Pacific States Cast Iron Pipe Company
- (b) Tyler Pipe

3-2.8 Approved Fittings Manufacturers

- (a) Pacific States Cast Iron Pipe Company
- (b) United States Pipe and Foundry Company
- (c) Dayton
- (d) Clow
- (e) Trinity Valley
- (f) Reliable

3-3 CEMENT-MORTAR LINED AND COATED STEEL PIPE

3-3.1 General

These specifications apply to cement-mortar lined and coated steel pipe used in distribution piping. All C.M.L. & C. steel pipe shall comply with Section 207-10 of the Standard Specifications, and as specified herein.

Pipe furnished by the Contractor shall be manufactured under one roof by one company. This provision is to confine the manufacturing process of the pipe and pipe specials to one manufacturer. For welded steel pipe, this will include the milling of steel plate or coil into the pipe cylinder, lining and coating operations, the fabrication of fittings and pressure testing. Welded steel pipe may be manufactured by a City approved subcontractor of the pipe supplier, with supplier providing for fabrication of fittings. However, the supplier shall provide quality inspection of the pipe manufacturing process.

Pipe supplied by the Contractor shall be engineered and designed by the pipe manufacturer. This shall include all engineering calculations called for in the applicable AWWA or ASTM standards and any other calculations required to design

the pipe in accordance with sound engineering practices. The pipe manufacturer shall submit shop drawings covering all pipe manufacturing specifications and fabrication details.

3-3.2 Certifications by Manufacturer

The manufacturer shall submit a sworn statement that the pipe furnished has been sampled, tested and inspected in accordance with these Specifications and that the results thereof comply with the requirements of these Specifications.

3-3.3 Inspection and Testing

Inspection in the plants shall be by the manufacturer. Testing to insure compliance with these Specifications shall be made in accordance with ANSI/AWWA C-200 and C-205 within the Continental United States at the last point of loading on rubber tired vehicles before delivery to the job site.

3-3.4 Design Criteria

The C.M.L. & C. steel pipe furnished under these Special Provisions shall be engineer designed to meet the following requirements:

C.M.L.&C. Steel Pipe

- a) Working water pressure 150 psi.
- b) Water hammer pressure at 45 psi, plus the working water pressure of 150 psi.
- c) Design pressure 150 psi.
- d) Earth cover as indicated on the Plan & Profile sheets.
130#/C.F., 4' cover minimum $K_u = 0.150$.
- e) Traffic loading - AASHTO H-20, S-16, Impact factor - 1.5 for depths to 4.0 feet.
- f) Deflection limit - 2% I.D.
- g) Water hammer stress + static pressure stress not to exceed .75 yield stress.

The Contractor shall submit the manufacturer's specifications for fabrication, handling and installation, rubber gaskets and joint lubricant in addition to the required drawings, tests, and affidavit of compliance.

The cross-sectional area of steel in the wall of the pipe cylinder shall be based on one-half of the yield point of the steel used, but not to exceed 16,500 psi.

Steel cylinders shall have a wall thickness of not less than 12 gauge (0.105 inch).

3-3.5 Fabricated Steel Pipe

Fabricated steel pipe shall consist of straight butt seam or spiral butt seam electrically welded steel cylinders, shop fabricated from plates or sheets manufactured and tested in accordance with AWWA C-200 and Federal Specification SS-P-385a.

All in accordance with the sub-section with the addition of ASTM A-570, Grade "C", Hot-Rolled Carbon Steel Sheets, Structural Quality, to the listed tables.

3-3.6 Cement-Mortar Lining and Coating

All steel pipe furnished shall be cement-mortar lined and coated in accordance with the Section 207-10.4.2 of the Standard Specifications, except that the table be revised as follows:

Pipe Diameter (In.)	Lining Thickness (In.)	Tolerance (In.)	Coating Thickness (In.)	Tolerance (In.) No Minus Tol.)
4" thru 12"	5/16"	$\pm 1/16"$	3/4"	$\pm 1/4"$

3-3.7 Approved Pipe and Fittings Manufacturers

- (a) United Concrete Pipe
- (b) Ameron Pipe Products

3-4 MISCELLANEOUS PIPE

3-4.1 General

These Specifications apply to miscellaneous piping used for appurtenant construction and water services. All miscellaneous piping shall conform to these Specifications unless shown otherwise on the Plans or Standard Drawings.

3-4.2 Copper Tubing or Pipe

Copper tubing or pipe used for service connections, air valves or blow-offs shall be Type "K" soft copper conforming to A.S.T.M. B-88. Hard drawn copper shall be used for air valve and blow-off risers. When wrought copper solder type fittings are shown on the Plans or Standard Drawings the joints shall be soldered using a lead free, tin based alloy solder meeting Federal requirements for lead free solders mandated by the Federal Safe Drinking Water Act, with a flux specifically designed for the solder alloy. Use J. W. Harris Co., Stay Safe 50, Stay Safe Bridget, or City approved equal.

3-4.3 Red Brass Pipe

Red brass pipe used for service connections, air valves or blow-offs shall conform to A.S.T.M. B-43.

3-4.4 Steel Pipe

Steel pipe used in 4 inch and larger fire or domestic services and guard posts shall conform to A.S.T.M. A-120, Schedule 40.

3-4.5 Galvanized Steel Pipe

Galvanized Steel Pipe used as 2-inch service bypasses shall conform to A.S.T.M. A-120, Schedule 40.

3-4.6 Gate Box Material

The respective minimum thicknesses of steel pipe used for 8-inch and 10-inch gate boxes shall be 14 and 12 ga. Pipe shall be seamless steel, conforming with the requirements of ANSI/AWWA C-200. Material shall be factory dipped in Trumble Asphalt Dip, or an approved equal.

3-5 RESILIENT WEDGE GATE VALVES

3-5.1 General

This section of the Specification covers resilient wedge gate valves for use in the water distribution system.

Resilient wedge gate valves shall conform to the latest revision of ANSI/A.W.W.A. C-509 and the following:

1. Resilient wedge gate valves shall have iron body, bonnet, and gate, with all bronze internal mountings and working parts. Valve stems shall contain no more than 5% zinc and 2% aluminum.
2. Resilient wedge gate valves shall have non-rising stems, O-rings sealed, with two O-rings above the thrust collar, with a 2-inch square operating nut, opening counter-clockwise, and shall be designed for 200 psi water working pressure. Stuffing box opening at valve stem shall be coated with an approved dry film lubricant, "Dry-lube" or approved equal.
3. Resilient wedge gate valves shall have sizes and type of valve ends as shown on the plans or Standard Drawings.
4. Resilient wedge gate valves shall be handled and stored in accordance with ANSI/AWWA C-509 Appendix A.1 through A.4.
5. Resilient wedge gate valve suppliers shall furnish the City with an affidavit of compliance, catalog data and certified drawings.
6. Resilient wedge gate valves shall have all interior and exterior ferrous surfaces exposed to water epoxy coated by the manufacturer. The coating shall be applied at the factory per the manufacturers recommendations and in conformance with AWWA C-550. Valve supplier shall furnish the City with an affidavit stating that the interior coatings have been applied in accordance with the manufacturers specification, prior to installation.

3-5.2 Resilient Wedge Gate Valves-Fire Services

Gate Valves used in Fire Services shall be outside screw and yoke (O S & Y) with flanged ends, conventional packing and furnished with a handwheel. The R.W. gate valves shall comply with Section 3-5.1; however, the valves shall be of the rising stem design. Valves shall be listed and approved by Underwriter Laboratories, Inc. or Factory Mutual.

3-5.3 Resilient Wedge Gate Valves - Tapping

Tapping gate valves shall conform with all requirements of Subsection 3-5.1, and the following:

1. Tapping valves shall have a Class 125, ANSI B16.1 flanged inlet and an outlet as shown on the construction plans.
2. Tapping valves shall be compatible with the tapping sleeve described in Subsection 3-9.8, and the tapping machine utilized for wet tapping the water main.

3-5.4 Approved Manufacturers

1. Waterous Series 500
2. Clow Series 2630
3. AVK Series 25

3-6 BRONZE GATE VALVES

3-6.1 General

1/4-inch through 3-inch bronze gate valves shall conform to Federal Specification WW-V-54D Class A, Type 1 and the following:

1. Bronze gate valves shall be 200 psi water, oil, gas, and 125 psi saturated steam, non-rising stem, union bonnet, solid wedge disc and screw ends.
2. Bronze gate valves used in air valve or 2 inch blow-off installations shall be fitted with a 1 inch square X 1/2 inch thick cast iron operator nut.

3-6.2 Approved Manufacturers

- (a) Stockham - B - 115
- (b) Milwaukee Valve, Co. Model 1142

3-7 AIR RELEASE VALVES

3-7.1 General

Air Valves shall conform to the following:

1. Air valves shall be heavy duty combination air and vacuum relief and air release valves.

2. Air valves shall be designed for 150 psi working pressure and a 300 psi test pressure.
3. Air valves shall be of the air release/vacuum type with brass, or stainless steel internal parts.
4. Air valves 2-inch and smaller shall have screwed inlets.

3-7.2 Approved Manufacturers

(a) Crispin 2" - UL20, 4" - U41

3-8 FIRE HYDRANTS

3-8.1 General

1. Fire Hydrants shall have 6" flanged inlet connections with six 3/4" holes drilled on a 9-3/8" bolt circle.
2. Fire hydrant outlet nozzles shall be of the quantity and size specified and with National Standard Hose Threads.
3. Fire hydrants shall be furnished with 1-3/4" pentagon spanner nuts on operator stems and nozzle caps. Nozzle caps shall be constructed of cast iron.
4. Fire hydrants from Clow Corporation shall be supplied with Type B carrier valves. Fire hydrants from Long Beach Iron Works shall be supplied with the Logan valve assembly. Valve rubber shall be 5/8" thick for 2-1/2" outlets and 3/4" thick for 4" outlets.
5. Fire hydrant valves shall be slow opening.
6. Fire hydrant stems shall have "O" ring packing and be constructed of ASTM B-62 (85% copper, 5% tin, 5% lead, 5% zinc).
7. Fire hydrants shall be painted per A.W.W.A. C-503:
Exterior color shall be fire hydrant yellow.
8. Fire hydrant supplier shall furnish an affidavit of compliance to ANSI/A.W.W.A. C-503.
9. Regular fire hydrant outlet - (1 - 2-1/2" & 1 - 4")
Super fire hydrant outlets - (2 - 2-1/2" & 1 - 4")

3-8.2 Approved Manufacturers and Models

a. Regular Fire Hydrant:

Clow Corp., Corona, California. Ranger, 900 Series, Model 950
(1-2-1/2" & 1-4")

Long Beach Iron Works, Inc., Long Beach, California. Anacapa Model 614 (1-2-1/2" & 1-4"), as modified for the City of Riverside

b. Super Fire Hydrant

Clow Corp., Corona, California. Ranger, 900 Series, Model 960 (2-2-1/2" & 1-4")

Long Beach Iron Works, Inc., Long Beach, California. Anacapa Model 615 (2-2-1/2" & 1-4"), as modified herein.

3-9

APPURTENANCES

3-9.1

General

This section of the Specifications covers appurtenances used in the water distribution system. Appurtenances include but are not limited to angle plug valves, valve boxes, meter boxes, vaults and covers, brass items, saddles, flanges, gaskets, bolts, flexible couplings, tracer wire, paint, protective coatings and concrete.

3-9.2

Angle Plug Valves (Wharf Hydrants)

1. Angle plug valves shall have 2" or 4" screwed (I.P.T.) inlet risers.
2. Angle plug valve outlet nozzles shall be of the quantity and size specified and with National Standard Hose Threads.
3. Angle plug valves shall be furnished with 1-3/4" pentagon spanner nuts on operator stems and nozzle caps.
4. Angle plug valves shall open counterclockwise.
5. Angle plug valve stems shall have conventional packing.
6. Outlets - (4" x 4", 4" x 2-1/2" and 2" x 2-1/2")

7.

Approved Manufactures and Models

James Jones Company, El Monte, California. Cat. No. J-342 (2x2-1/2): Cat. No. J-344 (4x2-1/2)

Clow Valve Company, Corona, California. Model 125 (4x4); Model 123 (4x2-1/2)

3-9.3

Valve Box Caps

8-inch or 10-inch valve boxes shall consist of a cast iron cap marked CWD with the City of Riverside pattern. The cap shall be supplied with two coats of asphalt varnish and painted with two coats red primer in the field. See painting schedule, Section 3-9.17. Cap shall be manufactured by South Bay Foundry, San Diego, CA, or City approved equal.

3-9.4 Meter Boxes

1. Precast concrete meter boxes shall be provided for 5/8-inch thru 2-inch water meters. Meter boxes shall be furnished with a concrete cover and lid except where cast iron or steel traffic covers are called for on the plans.

2. Approved Manufacturers and Models

5/8", 3/4" and 1" Meter	---	Brooks No. 37 (Solid Concrete Cover) Quikset WA-20 (Solid Concrete Cover)
	---	Brooks No. 37T (Cast Iron Traffic Cover) Quikset WS-20 (Cast Iron Traffic Cover)
1-1/2" and 2" Meter	---	Brooks No. 65S (Concrete Cover with Reading Lid) Quikset WI-30 (Concrete Cover with Reading Lid)
	---	Brooks No. 65TR (Steel Traffic Cover with Reading Lid) Quikset WY-30 (Steel Traffic Cover with Reading Lid)

3-9.5 Vaults and Covers

1. Sectional precast concrete vaults shall be provided for three inch and larger water meters and for fire services four inches and larger.
2. Breakaway webs shall be furnished in the size and location required for use as pipe slots. All joints shall be sealed with an approved sealant.
3. Cover plates shall be 3/8-inch thick diamond plate. All 4' x 8' vaults shall be constructed with four (4) tiers for 8" and 10" fire services; and with three (3) tiers for all 4" and 6" fire services, and 3", 4" and 6" water services. All 6' x 10' vaults shall use three (3) tiers. See Painting Schedule in Section 3-9.17.
4. Vaults shall be supplied with an adjustable cover per CWD 800, 801, or 802.
5. Reinforcement steel shall be Grade 40 or Grade 60 billet steel conforming to A.S.T.M. A-615.
6. Cement used in vaults or manholes shall be Type II. Concrete shall develop a minimum strength of 3,000 psi at 28 days in conformance to A.S.T.M. C-150. All coarse and fine aggregates shall conform to A.S.T.M. C-33.
7. Vaults used in traffic areas shall be designed for H20-S16 highway loads unless otherwise specified.

8. Vaults shall be:

3" thru 6" Meter -----	Brooks No. 848 w/sidewalk frame & cover
4" thru 10" Fire Service -----	Brooks No. 848 w/sidewalk frame & cover
8" Domestic Service -----	Brooks No. 8610 w/sidewalk frame & cover
10" Domestic Service-----	Quikset City of Riverside 8'x10' vault (Special) per CWD 802

or City approved equal.

3-9.6 Brass and Bronze Items

1. Brass and bronze items cover corporation stops, angle ball meter valves, meter couplings and service fittings.
2. All material used in the manufacture of this equipment shall be copper base alloy complying with A.S.T.M. B-62 and A.W.W.A. C-800.
3. All compression fittings shall be pack joint type connection for use with tubing.
4. All angle ball meter valves and corporation stops shall be constructed of the following: Heavy cast bronze body, double Buna-N rubber O-rings in stem, molded Buna-N rubber seat and supplied with lockwing.

5. Approved Manufacturers

ITEM	FORD	JONES	A.Y. McDONALD
1" Corp. Stop IPT x IPT	1"-F-500	1"-J-41	1" - 3152
" " " IPT x Compression	1"-F-1100	1"-J-3403	
" " " CC x Compression	1"-F-1000	1"-J-3401	
" " " CC x IPT	1"-F-400	1"-J-45	1" - 3128
 2" Corp. Stop IPT x IPT	 2"-F-500	 2"-J-1943	 2" - 3131
" " " IPT x Compression	2"-F-1100	2"-J-1935	
" " " CC x Compression	2"-F-1000	2"-J-1937	
" " " CC x IPT	2"-F-400	2"-J-1944	2" - 3128B
 1" Angle Ball Meter Stop	 BA43-444W	 1"-J-1963W	
2" Angle Ball Meter Stop	BFA13-777W		
 1" x 3/4" Meter Adaptor	 A34	 1" x 1-1/4", J-128-H	
1" Meter Coupling	C38-44-2.625	1"-J-134	
3/4" Meter Coupling	C38-23-2.5	3/4"-J-134	
2" Coupling (IPM x Compression)	C84-77	2"-J-2605	

3-9.7 Service Saddles (Service Clamps)

1. Saddles shall be all bronze double strap type, with neoprene seal ring gasket.

2. Approved Manufacturers

- (a) Mueller Cat. No. H-16123, H-16126, H-16130, H-16134, H-16137
- (b) Rockwell Cat. No. 323-0510 thru 323-1426
- (c) R.H. Baker Cat. No. 183-413 TAP thru 183-1426 TAP
- (d) Jones Cat. No. J-979

3-9.8 Tapping Sleeves

1. Tapping sleeves shall be: (1) ductile iron body construction, with mechanical type joints on both sleeve ends, and a class 125 ANSI B16.1 flanged outlet; or (2) ASTM A-276, type 304 or 304L stainless steel body construction, with full circumference gasket, and flange outlets meeting the requirements of Section 3-9.9. Flange materials may include ASTM A-276, type 304 or 304L stainless steel.
2. Sleeves shall be compatible with the tapping gate valves, as described in Subsection 4-4.
3. Sleeves shall be designed for a working pressure of 200 psi and be supplied with a 1/2" - 3/4" I.P.F. coupling or tap and corporation stop for pressure testing sleeve.
4. Approved Manufacturers

Stainless Steel Sleeve

- (a) Rockwell 662 or 663
- (b) Romac SST
- (c) Clow 34909-AS

Mechanical Type Joint

- (a) Mueller-Mechanical Joint Tapping Sleeve
- (b) Clow-Mechanical Joint Tapping Sleeve
- (c) Waterous-Mechanical Joint Tapping Sleeve

3-9.9 Flanges

1. All steel flanges shall be Class D Steel Hub Flanges conforming to A.W.W.A. C-207 and all ductile iron flanges shall conform with the requirements of AWWA C-115.
2. Steel flanges shall be of the slip-on welding pattern.
3. Flanges shall be flat faced or may have a serrated finish of approximately 32 serrations per inch, approximately 1/64-inch deep. Serrations may be spiral or concentric.
4. Plate or blind flanges shall have flange faces machined flat and shall be center drilled and tapped 1-inch I.P.T., for 4-inch through 10-inch flanges; 2-inch I.P.T. for 12-inch and larger flanges; and furnished with a standard square head pipe plug.

5. For 1-1/2-inch and 2-inch water service installations a 2-inch brass screw meter flange shall be used, conforming with Section 4.4 of AWWA C-701.

3-9.10 Flexible Couplings

Flexible couplings and flange coupling adapters shall conform to the following:

1. Each coupling shall consist of one steel or ductile iron middle ring, two steel or ductile iron followers, gaskets and sufficient numbers of steel bolts to compress the gasket without distorting the followers.
2. The thickness of the middle ring shall be such that the stress shall not exceed 50 percent of the yield point when subjected to the hydrostatic test pressure of the pipeline. The middle ring thickness shall not be less than the thickness of the pipe joined.
3. The middle rings shall be coated with Keysite 740 or City approved coating to a minimum dry film thickness of 10 mils. Follower rings shall be coated with a shop coat that a field coating will easily adhere to.
4. Bolts shall be 5/8 inch diameter carriage bolts with hexagon nuts. The steel shall have a minimum yield strength of 40,000 psi. Bolts shall be zinc plated or coated with a rust resistant finish in conformance with AWWA C-111.
5. Gaskets shall be composed of a crude or synthetic rubber base suitable for use in potable water supply systems.
6. Adapter flange and follower on flanged coupling adapters shall be constructed of ductile iron, meeting or exceeding ASTM A536, with flange bolt dimensions per AWWA C207 for a Class D flange.

7. Approved Manufacturers

A. Flexible Couplings

- (a) Baker Series 200
- (b) Dresser Style 38
- (c) Rockwell 411 & 441
- (d) Romac Style 501
- (e) Ford Style FC1 & FC2

B. Flanged Coupling Adapters.

- (a) Baker Series 601
- (b) Rockwell 912, 913, 914, 916
- (c) Ford Style FFCA
- (d) Romac FCA 501

3-9.11 Gaskets

Where gaskets are to be furnished, they shall be 1/8" Minimum thickness, cloth inserted rubber, full face gaskets meeting Federal Specifications HH-P-151.

3-9.12 Nuts and Bolts

Where nuts and bolts are to be furnished for fastening flanged joints, they shall be hexagonal head machine bolts and hexagonal nuts. Steel Standard A.S.T.M. A-307, Grade B; dimensions of bolts and nuts, ANSI B1.1, coarse thread series, Class 2A fit on bolts and Class 2B fit on the nuts; all nuts and bolts shall be cadmium plated per ASTM A-165, electroplated zinc per ASTM B-633 or hot dipped galvanized per ASTM A-153. Bolt length shall conform with the requirements of AWWA C-207.

Break-off bolts for fastening fire hydrants to the bury shall be 5/8 inch diameter by 3 inches long counter bored 5/16 inch to a depth of 2-3/8 inches.

3-9.13 Joint Lubricant

Joint lubricant used on cast iron, C.M.L. & C. steel and asbestos cement pipe joints shall contain an effective preservative per U.S. Pharmacopeia, 1975, 19th Edition. The supplier shall submit test reports from an approved independent laboratory for approval by the Engineer.

3-9.14 Tracer Wire

Tracer wire shall be used on all asbestos cement pipe. The wire shall be copper wire, solid Size AWG #8 minimum or City approved equal. Joints shall be butt spliced using a U.L. approved crimping connector.

3-9.15 Polyethylene encasement

Polyethylene encasement shall have a minimum thickness of 8 mil and conform with Section 5-3 of AWWA C-105/ANSI A21.5. Polyethylene film shall be Class C.

3-9.16 Concrete

Concrete for thrust blocks, anchors, pipe cradles, footings or encasements shall be Portland Cement concrete, Type I or II, 480-C-2000 unless otherwise specified.

3-9.17 Paint and Protective Coating

3-9.17.1 Approved Manufacturers

All of the following paints, with the exception of red primer and black, shall be industrial strength enamels.

<u>Color</u>	<u>Designation</u>	<u>Availability</u>
<u>Red primer</u>	Rustoleum 1069	(3)
<u>Green</u>	Pervo #2428, Industrial Green	(1)
	Fuller Obrien 612-65, Shutter Green	(2)
	Rustoleum #1282 Forest Green	(3)
<u>Yellow</u>	Pervo #2420	(1)
	Rustoleum #944, Federal Safety Yellow	(3)

<u>Orange</u>	Fuller Obrien 612-56, Tower Orange	(2)
	Rustoleum 956, Federal Safety Orange	(3)
<u>Aluminum</u>	Pervo #2404	(1)
	Rustoleum #470	(3)
<u>Black</u>	Koppers #50 bitumastic	(3)
	Koppers Super Tank Solution	(3)

- (1) Available from Pervo Paint in Los Angeles, 213-758-1147.
- (2) Available from Fuller O'Brien Paint Store in Riverside, 686-4311.
- (3) Available at most paint and hardware stores.

3-9.17.2 Protective Coatings

All flanged joints and flexible couplings in contact with the soil shall be coated with one coat of Super Tank Solution or Koppers #50 bitumastic, wrapped with two layers of 8 mil. polyethylene, and secured to the pipe and seam sealed with two-inch-wide Scotchrap #50 or City approved equal.

3-9.18 PVC Closure Pipe

1. Polyvinyl Chloride (PVC) Pressure Pipe used in the final closure of ACP shall comply with the requirements of AWWA C-900, as revised herein.
2. Pressure class shall be equal to or greater than the adjoining ACP.
3. PVC pressure pipe O.D. shall be equal to the O.D. of adjacent ACP, or manufacturer approved adaptor gaskets shall be employed for joint closure.
4. Maximum closure length shall be 6'-6".

5. Approved Manufacturers

Certain-Teed Products Corporation

3-10 Unfit or Rejected Material

All material shall be inspected for defects and conformity to the Specifications prior to and following installation. Any pipe, valve or appurtenance determined by the Inspector to be in conflict with these specifications, shall be rejected and immediately removed from the Job site.

3-11 Material List and Drawings

The Contractor shall submit to the Engineer for approval an original list of material which he proposes to install. The list shall be complete as to the name of the manufacturer, size and catalog number of unit; and shall be supplemented by such other data as may be required, including detailed scale drawings, any non-standard special material and shall show any proposed deviation from the Plans. The Contractor shall submit for approval, when requested, sample articles of any materials proposed for use. All such data

shall be submitted in duplicate for checking. After checking, correction, and approval, not less than three complete sets shall be submitted to the Engineer. The Contractor shall be responsible for any material purchased, labor performed, or delay to the work prior to such approval.

The Contractor shall also furnish all literature and drawings which are received with equipment to be installed, and which pertain to the engineering, installation, operation and maintenance of that equipment.

PART 4 - CONSTRUCTION METHODS

All as provided in Part 3 of Standard Specifications for Public Works Construction except as modified herein.

SECTION 306 - UNDERGROUND CONDUIT CONSTRUCTION

306-1 OPEN TRENCH OPERATIONS

306-1.1 TRENCH EXCAVATION

306-1.1.3 Maximum and Minimum Width of Trench

For water pipelines, the minimum width of trench shall be the pipe O.D. plus 12 inches. The maximum trench width shall be the pipe O.D. plus 36-inches. Width shall be measured at the top of the pipe.

In the event of cave-ins of the trench sides where the maximum width is exceeded, the Engineer may, at his discretion, require the Contractor to use special bedding per CWD-041.

306-1.1.7 Minimum Cover and Clearance

The minimum depth of cover listed below shall be provided between the top of the main and the undisturbed subgrade or finished grade, whichever provides the greater cover, unless otherwise approved by the city.

	<u>Sub-Grade</u>	<u>Finished Grade</u>
(1) 6" & 8" diameter	2' - 0"	3' - 0"
10" & 12" diameter	3' - 0"	4' - 0"
(2) 6" Cover between the top of the valve stem and the ground surface at the time of construction.		

A minimum vertical clearance of 12 inches shall be maintained between all foreign structures or utilities unless shown on the Plans and approved by the Engineer.

306-1.2 INSTALLATION OF PIPE

306-1.2.1 Bedding

(1) Asbestos Cement Pipe

Asbestos cement pipe may be supported in the trench for bedding by providing "bell holes" or "earth mounds."

When the "bell hole" method is selected, 4-inches of bedding material shall be placed in the trench and uniformly compacted to 85%. Bell holes shall be dug to provide 2" minimum clearance below the couplings before the pipe is lowered into the trench.

When the "earth mound" method is selected, a minimum of two mounds, full trench width and at least 12" along the length of the pipe, shall be built to support the pipe and to prevent the pipe from settling during and after assembly until fully backfilled. The mounds shall be located under the supporting points of the pipe and of sufficient height to provide 2" minimum clearance below the coupling before the pipe is lowered into the trench.

The bedding surrounding and twelve (12) inches above the pipe shall be compacted to 85% by hand tamping bars, mechanical or jetting in uniform lifts unless otherwise specified.

In rocky ground the bedding shall be extended to 6 inches below the pipe.

Asbestos cement pipe shall be placed with bedding per CWD-040 for the full length of the project. The bedding shall extend 4 inches below to 12 inches above the pipe within the trench width. The Contractor shall provide for drainage of the trench upon jetting of the sand and shall take measures to prevent flotation of the pipe, if this method of compaction is selected. Native trench material having a sand equivalent of 30 or greater will be allowed as bedding material only after the submittal of laboratory test reports.

(2) Ductile Iron Pipe and C.M.L. & C. Steel Pipe

Ductile iron pipe shall be placed on a 4-inch minimum layer of evenly graded loose soil bedding. Loose soil is defined as native material excavated from the trench, free of rocks and foreign materials, and with a sand equivalent of 30.

Bell holes shall be dug from the bedding such that the pipe barrel when first laid, shall uniformly bear on the bedding. The bedding surrounding and twelve (12) inches above the pipe shall be compacted to 85% by hand or mechanical tamping or water jetting in uniform lifts unless otherwise specified.

In rocky ground the bedding shall be extended to 6 inches below the pipe.

306-1.2.6 Field Jointing of Cast (Ductile) Iron Pipe

Ductile iron pipe and fittings shall be joined in accordance with the manufacturer's installation manual and A.W.W.A. C-600 unless otherwise indicated herein.

All spigot ends for cement or lead joints shall have a raised bead by manufacture or by 1/4-inch brazed bead.

(a) Cement Joints

Untarred jute or oakum gasket materials are not allowed. A gasket of clean paper twisted into a rope shall be used.

(b) Lead Joints

Untarred jute or oakum gasket materials are not allowed. A gasket of braided asbestos shall be used.

(c) Adjustment Pipe

The Contractor shall provide necessary cut-to-fits to place all valves, elbows, or outlets on the design station. All cut ends and rough edges shall be ground smooth and for push-on type joints, the cut end shall be beveled slightly.

(d) Joint Deflection

The Contractor may deflect the joints to "pull through" the vertical angle points or horizontal curves shown on the plans. The Contractor shall limit deflection of the joint to 80% of that listed by the manufacturer.

(e) Polyethylene Encasement

All ductile iron pipe shall be wrapped with 8 mil minimum thickness polyethylene encasement per Section 5-4 of AWWA C-105/A.N.S.I. A21.5-82. The Contractor may use Method A, B, or C for installing the polyethylene tube or sheet. The Engineer may waive the requirement for runs of 13' or less.

306-1.2.8 Field Jointing Asbestos Cement Pipe

Asbestos Cement pipe and fittings shall be joined in accordance with the manufacturer's installation manual and A.W.W.A. C-603 unless otherwise indicated herein.

The Contractor shall place at his own expense a copper wire on the top center of all asbestos cement pipelines. The copper wire shall not be less than a #8 and shall be securely tied to the pipe, valves, fittings and copper services such that the wire will remain in place during backfilling, jetting and compaction. The wire must be spliced to form a continuous line between fittings and valves. The wire shall be spliced to all service wires or wrapped at each service. A copper wire shall also be brought up at the base of each fire hydrant.

(a) Adjustment Pipe

- (1) The Contractor shall provide necessary cut-to-fits to place all valves, elbows, or outlets on the design station.
- (2) Milled over all, MOA, or full milled, F.M., sections will not be allowed. Placing of other fittings to station shall be accomplished by field milling PVC pipe or use of standard short lengths. A full 3'-3" MEO (milled end only) section shall be placed on each side of any valve or fitting. PVC closure pipe conforming with Section 3-9.18 may be field cut for final closures. Field cutting shall comply with manufacturer's instructions.
- (3) The Contractor shall furnish adapters as necessary between pipe of different pressure class or between pipe and fitting of a different pressure class.

(b) Joint Deflection

The Contractor may deflect the joints to "pull through" the vertical angle points or horizontal curves shown on the plans. The Contractor shall limit deflection of the joint to 80% of that listed by the manufacturer. For pipe with factory installed couplings the deflection will be limited to 40% of that listed by the manufacturer.

306-1.2.13 Flanged Joints (General)

In assembling a flanged joint, the Contractor shall align the flanges and draw up the flange bolts evenly so that no portion of the assembly will become prestressed.

All nut and bolt threads shall be lubricated with oil and graphite or "No-Ox-Id-Grease" prior to installation.

Coat and wrap flanged joints per Section 3-9.17.

306-1.2.14 Flexible Coupling (All Pipe)

Flexible coupling joints shall be used only when shown on the Plans or Standard Drawings. Flexible coupling joints shall be installed in accordance with the manufacturer's recommendations.

When indicated on the Plans or Standard Drawings, special anchoring devices shall be provided to prevent joint failure.

Couplings shall be coated with Super Tank Solution, Koppers #50 bitumastic or a City approved equal coating and wrapped with 2 layers of 8 mil polyethylene. The polyethylene shall be secured to the pipe with 2 inch Scotchrap No. 50 or City approved equal polyethylene adhesive tape.

306-1.2.15 Welded Joints

All welding carried out by the Contractor shall be governed by A.W.W.A. C-206, Field Welding of Steel Water Pipe. All joints shall be arc welded and shall be welded to maximum strength in conformance with American Welding Society specifications unless otherwise specified by the City. A minimum of two 1/8-inch passes are required at each external joint.

306-1.2.16 Sanitary Precautions

The Contractor shall take necessary precautions to protect the pipe interior, fittings, and valves from contamination.

When pipelaying is not in progress, or at the end of the days work, all openings in the pipeline shall be closed with water tight, rodent-proof plugs. The Contractor shall have an emergency plug at the pipe heading at all times during pipelaying for use in case of an accidental break of an adjacent or crossing facility. Should water, mud, or any other matter enter the pipe, the pipe shall be thoroughly cleaned and swabbed as necessary with a 5 percent hypochlorite disinfecting solution.

No contaminated material or material capable of supporting prolific growth of micro-organisms shall be used for sealing or lubricating joints. Packing material shall be handled in such a manner as to avoid contamination. Packing material for cast iron pipe shall conform to A.W.W.A. C-600.

306-1.2.17 Construction Water

The Contractor shall not operate any gate valve on any existing main. All water must be measured through a meter which can be checked out from the City Corporation Yard.

All construction equipment involving the filling, pumping, spraying and carrying of water, etc., shall be under cross-connection control regulations, City of Riverside Water Division and shall be checked by the Cross-Connection Technician, Phone 782-5420, before use. Also, an Approved Backflow Device shall be used while filling, flushing or chlorinating the mains. Valves at the tie-ins shall not be opened to supply water for any purpose until all testing is accepted.

NOTE: The Construction Contractor shall pay all rental and deposit for fire hydrant meters or backflow devices before they are checked out from the City, plus charges for water used. All rentals, deposits, and water charges shall be paid to the Water Services Section, located on the third floor of City Hall.

306-1.3 BACKFILL AND DENSIFICATION

306-1.3.2 Mechanically Compacted Backfill

Impact type pavement breakers (stompers) will be permitted over asbestos cement, C.M.L. & C. steel, cast iron and ductile iron pipe at the discretion of the Contractor. Damaged mains or appurtenances will be replaced at the Contractor's expense.

306-1.3.3 Water Densified Backfill

Floataction of Pipe

The Contractor shall at all times protect the pipe against floataction due to water entering the trench from any source, and shall assume full responsibility for any damage due to this cause, and shall at his own expense, restore and replace the pipe to its specified condition and grade, if it is displaced due to floating. Flooding will not be permitted.

The Contractor shall provide for drainage of the trench when jetting the bedding or backfill.

306-1.4 Testing Pipelines for Leakage

See Part 5 - of this Specification. Testing and Sterilization of Water Mains and Appurtenances.

306-1.5

TRENCH RESURFACING

306-1.5.1 Temporary Resurfacing

Except as otherwise provided by the Plans or approved by the Engineer, not more than 30 calendar days shall elapse at a specific location between the placement of temporary resurfacing and its removal and replacement with permanent resurfacing.

306-1.5.7 Valve Box Adjustments

Valve boxes within an area to be paved will be set to the finished pavement grade by the Contractor after paving of the street. Repaving required as the result of adjusting the valve boxes to grade shall be the responsibility of the Contractor.

306-10

INSTALLATION OF APPURTENANCES

306-10.1 General

The installation of appurtenances shall be in accordance with the following sections and the Standard Drawings referred to therein. The Contractor shall provide a complete and operating improvement as delineated in the Plans and these Specifications. If the Engineer finds that an appurtenance is improperly installed, the appurtenance shall be adjusted or removed and reinstalled properly.

306-10.2

VALVE INSTALLATIONS

1. The Contractor shall install the valves at the locations shown on the Plans and Standard Drawings.
2. The Plans shall indicate the station, size, type, and end condition of all mainline valves. The Standard Drawings shall indicate such information for appurtenant installations.
3. Valves shall be installed in a level position with the operating stem vertical except where shown otherwise on the Plans.
4. Valves shall be stabilized and supported separately from the pipeline as shown on the Plans or on the Standard Drawings. Mainline valves shall be considered as a dead end for thrust block sizing.
5. Mainline and appurtenant valves shall be tested for leak-proof tightness after the main line pressure test, at the test pressure, as described in Part 5.
6. The Contractor shall install valve boxes at all valve locations except where shown otherwise on the Plans.
7. All valves shall be installed in conformance with Appendix A of AWWA C-500.

306-10.3

WATER AND FIRE SERVICE WET TAP VALVE INSTALLATIONS

1. Valves shall be installed in conformance with Section 306-10.2.
2. Tapping tee and valve shall be disinfected per Section 5-8.
3. Contractor shall pressure test the tapping sleeve and gate valve per Section 5-2, prior to tapping main.
4. Contractor or subcontractor shall have a State of California Class C-34, C-36, or C-61 (Water Main Drilling) contractor's license and shall submit to the Engineer for approval, a minimum of three references from prior potable water wet tapping projects.

306-10.4

VALVE BOX INSTALLATIONS

1. The Contractor shall install valve box cap, sleeves, riser and valve operator extensions of the type indicated in the Standard Drawings at each valve location shown on the Plans in accordance with the Standard Drawings.
2. Operator extensions and sleeves shall be centered and set plumb over the valve operator nut.
3. Shaft extension is required where the distance between the finished ground surface to the valve operator nut is greater than 3.5 feet.
4. Operator extensions shall be fitted with an A.W.W.A. 2-inch square operating nut and a tapered socket end for the valve operating nut. The extension shaft shall extend from the valve nut to within 18-inches of the finished ground surface.
5. Operator extension shaft, nut, socket and centering guide shall be painted with one coat of red primer after fabrication.
6. The valve box cap shall be set flush to 1/4" above the finished pavement surface.
7. Where valve box installations are not within paved areas, a 3 foot square by 4-inch thick asphalt pad shall be formed around the cap, with a 2" X 4" redwood header form around the perimeter of the asphalt.
8. The valve box cap shall be painted per Section 3-9.17.
9. Valve box caps shall fit securely in the slip sleeves, to prevent displacement due to traffic loads.

306-10.5

AIR VALVE INSTALLATIONS

1. The Contractor shall install air valve installations at the locations shown on the Plans or at high points in the main as directed by the Engineer in accordance with Standard Drawings.

2. The Plans shall indicate the outlet station, size, direction and location of the air valve assembly.
3. The piping between the outlet valve and the ell on the air valve riser shall be at a continuous upgrade of not less than 1/4-inch per foot.
4. On 1 and 2-inch air valves, all joints shall be sweat welded per Section 3-4.2, unless shown as a screwed fitting. The riser shall be hard drawn copper.
5. The long axis of the air valve shall be set parallel to the street.
6. The air valve, exposed riser and guard posts shall be painted per Section 3-9.17.
7. The number and position of guard posts will be shown on the Plans.

306-10.6 BLOW-OFF INSTALLATIONS

1. The Contractor shall install blow-off installations at the locations shown on the plans in accordance with Standard Drawings.
2. Temporary blow-offs may be used for pressure testing, flushing and disinfecting the main. City Forces will remove the temporary blow-off when making the tie-in to the existing City System. Temporary blow-off installation materials will be returned to the Contractor at the job site.
3. Should the Contractor use a concrete thrust block, he shall provide a suitable separation material (such as tar paper or wood blocking) so that he may remove the thrust block without disturbing the end cap. The Contractor shall remove any temporary concrete thrust block prior to tie-in by City.

306-10.7 FIRE HYDRANT INSTALLATIONS

1. The Contractor shall install fire hydrants at the locations shown on the Plans in accordance with Standard Drawings.
2. The Plans shall indicate the outlet station, type, direction and location of the fire hydrant assembly.
3. The lateral between the outlet valve and the Fire Hydrant bury shall be a continuous run of all asbestos cement or all ductile iron pipe with approved joints.
4. The Contractor shall use non-breakaway flanged spools to adjust the Fire Hydrant to proper grade.
5. Fire Hydrant shall be painted per Section 3-9.17.
6. The bolts used to attach the Fire Hydrant to bury shall be counterbore knock off bolt type. Bolts shall be installed with threads pointing up and pack the counter bore with no-oxid grease.

7. The number and position of guard posts will be shown on the plans.
8. Special angle valve hydrants shall be installed only with the approval of the Engineer.
9. Contractor shall install hydrant markers in conformance with State Standard Specifications, Section 85, and Standard Drawing No. C.W.D.-700.

306-10.8 SERVICE INSTALLATIONS

1. The Contractor shall install water or fire services at the locations shown on the Plans in accordance with Standard Drawings.
2. The Plans shall indicate the water service station, size, direction and location of the meter box.
3. The Contractor shall place the service connection to the mainline within 18 inches of the desired location, and spaced a minimum of 2 feet on center.
4. The Contractor may open cut or "shoot-in" service laterals for copper services.
5. The City will install the water meter after completion of testing and adjustment of service stop and box to proper relationship with the curb or sidewalk.
6. Splicing of copper tubing is not allowed, except where 2-inch copper services exceed 20 feet in length and then only the minimum number of joints. Two inch copper splices shall be made using a solder coupling.
7. Saddles or tapped A.C. couplings shall be used for all service connections of 2-inches or less.
8. Where meter boxes are located in sidewalk areas, a meter spacer and meter coupling shall be installed and the service pipe shall be laid beyond the sidewalk prior to sidewalk installation.

306-10.9 PRECAST VAULT, MANHOLE & METER BOX INSTALLATIONS

1. The Contractor shall install precast vaults, manholes and meter boxes at the locations shown on the Plans or Standard Drawings.
2. The Plans or Standard Drawing shall indicate the station, location and size of the installation.
3. Cement for vault and manhole footings shall be Type II. Concrete shall be 480-B-2000, and poured against undisturbed or well compacted soil to the dimensions shown on the Plans or Standard Drawings.
4. All vaults and meter boxes located in sidewalk or paved areas shall be set flush with the existing surface.

306-10.10

CONCRETE FOR THRUST BLOCKS, ANCHORS AND PIPE CRADLES

1. Concrete thrust blocks, anchors or pipe cradles shall be poured at the locations and with the dimensions shown on the Plans or Standard Drawings.
2. Portland Cement shall be Type I or II. Concrete shall be Class 480-C-2000, shall be poured against undisturbed soil and shall make positive contact with the pipe with a minimum thickness of 12 inches.
3. Sandbags may be used to form thrust blocks or anchors unless otherwise specified.
4. Concrete shall be placed such that bell ends of fittings shall be available for repairs. Concrete placed over joints shall be removed.
5. Reinforcing steel exposed directly to the soil shall be coated with Super Tank Solution, Koppers #50 bitumastic or City approved equal coating, prior to pouring the thrust blocks.

306-10.11

CURB MARKINGS

Location ties of all valves and blow-offs shall be marked with a 2" x 1/2" wide "+" using orange paint on the top of the closest curb from two (2) locations. One edge of the "+" in the direction of the tie shall be elongated 1" with the distance from tie to curb face shown in 2" high lettering. One set of the Plans shall be marked with the locations and dimensions and submitted to the Water Division Inspector.

The locations of all services shall be marked with a chiseled "+" on the curb face. The pipe line station of the corporation stop shall be "As Built" on the Plans and submitted to the Water Division Inspector. The "+" shall be chiseled in the curb by the Contractor at the time of construction. The chiseled "+" shall be 2" high by 2" wide and 1/8" deep.

306-10.12

CONNECTIONS TO EXISTING MAINS

The Water Division shall make all wet-tap connections to existing mains and make closures thereto unless otherwise shown on the Plans.

The Construction Contractor shall verify the station, offset, and depth of the existing connection prior to laying the last 100 feet toward that station.

The Construction Contractor shall make necessary cut-to-fit, adjusting line and grade as necessary.

310-1 General310-1.5 Painting Schedule

<u>Item</u>	<u>Color (1)</u>	<u>No. of Coats</u>
Gate Box Caps and Rims	Red (primer)	1
	Orange	2
Air Valves	Green	1
Air Valve Guard Posts	Red (primer)	1
	Green	2
Vault Covers (top)	Red (primer)	1
	Aluminum	2
Guard Posts	Red (primer)	1
	Yellow	2
Vault Covers (underside)	Black	2
Fire Hydrants	Yellow	1
Fire Hydrant Guard Posts	Red (primer)	1
	Yellow	2
Manhole Covers	Green	2
Meter Piping and Valves	Black	2

(1) Refer to Section 3-9.17 for description of color designation and approved manufacturers.

310-5.6 Painting Traffic Striping, Pavement Markings and Curb Markings.

Striping and pavement markings for temporary detours and pavement restoration, shall conform to the provision of Sections 210, "Paint and Protective Coatings," and 310-5.6 "Painting Traffic Striping, Pavement Markings and Curb Markings" of the Standard Specifications and these special provisions. Striping and marking shall be under the direction of the City of Riverside Public Works, Chief Construction Inspector, phone 782-5346.

The Contractor shall provide for temporary or permanent striping on the same day the street is paved or resurfaced. Under no circumstances shall the traveled way be without lane delineation.

Permanent and/or temporary striping shall be placed on the pavement surface within 48 hours after notification by the Engineer. Pursuant to this requirement, the Contractor's attention is directed to Section 7-10.4.3, "Public Safety During Non-Working Hours, "of these special provisions.

As an option, reflective adhesive tape may be utilized for temporary striping. For dashed four (4) inch lane lines a minimum three (3) foot strip of tape shall be placed at twelve (12) foot intervals (gaps) regardless of the posted speed for the zone requiring temporary striping.

The Contractor will be required to remove all reflective adhesive tape applied to the pavement surface.

Temporary striping shall also include the designation (paint or tape) of crosswalks at signalized intersections. Implementation shall be as directed by the Engineer.

If the job is suspended because of weather or for any other reason, the Contractor shall be responsible for applying temporary striping as specified herein, and to maintain (repaint/retape) the temporary striping as directed by the Engineer. Said Section 7-10.4.3 of the Special Provisions will apply.

In addition to the requirements of Section 310-5.6.8 "Application of Paint" for bituminous seal coats, the Contractor shall apply two coats of paint to any new pavement surface. There shall be a minimum of 2 days between applications. This requirement shall not apply when painting over existing paint and/or existing untreated pavement surface. The two (2) applications requirement applies to permanent striping and pavement markings.

Cat tracking (premarking) for permanent and temporary striping shall consist of placing spots of paint not more than 3 inches in width and not more than 5 feet apart along the line established. Paint for cat tracks shall be the same as that used for the traffic stripe for which it is placed. If painting is scheduled on the same day as cat tracking, the spray can method may be used in lieu of the requirements specified herein.

The Contractor is responsible for straight layout with smooth long radius curves with no abrupt radius changes. Connecting curves shall be an appropriate radius to provide for smooth traffic flow at prevailing speeds. All transitions shall be approved by the Public Works Inspector prior to painting. Angle points and off-sets in the striping will not be allowed.

Striping details not shown on the plans or specified in Sec. 310-5.6.4 shall be done in conformance with the Traffic Manual as published by Caltrans.

All premarking (cat tracking) for permanent striping is subject to approval by the Public Works inspector prior to painting. The rope used for premarking shall be a minimum length of 500 feet of continuous fabrication, or longer if needed for smooth layout.

Drips, overspray or improper markings shall be immediately removed from the pavement surface by blast cleaning or methods approved by the Public Works Inspector at the Contractor's expense.

The lengths of the gaps and individual stripes that form broken traffic stripes shall not deviate more than 3 inches from the lengths shown on the plans.

The lengths of the gaps and individual stripes shall be of such uniformity throughout the entire length of each broken traffic stripe that a normal striping machine will be able to repeat the pattern and superimpose additional coats of paint upon the traffic stripe being painted.

Where the traffic stripe is of such a nature, either due to configuration or location, as to render the striping machine unsuitable for use, traffic paint and glass spheres may be applied by other approved methods and equipment. The Public Works inspector will determine if the striping machine is unsuitable for a particular use.

All stencils and templates shall conform in configuration and size to the state of California, Department of Transportation legends.

The Public Works Inspector at his own discretion may require random testing and sampling. A 10 percent failure of samples of items covered herein shall be cause for rejection.

310-5.7 Traffic Stripe and Pavement Marker Removal

Temporary construction zone traffic stripes and pavement markings shall be removed as directed by the Engineer.

Removal shall be accomplished through the method of wet "sandblasting" or other approved methods. The sandblasting operation shall be continued until all of the stripes, markers, debris or other materials are removed to the satisfaction of the Engineer. When sandblasting within 10 feet of a lane occupied by public traffic, the residue, including dust, shall be removed immediately after contact between the sand and the surface being treated. Equipment shall meet all applicable standards of the United States Environmental Protection Agency and the Riverside County Air Pollution Control District.

Areas of removal shall be feathered as not to leave a distinct shape of the removed painted item.

Measurement of the double yellow centerline shall be 0.667 square foot per linear foot.

Beach sand containing salt or excessive amounts of silt will not be allowed.

The development of a water supply and all water required for the work and its application shall be by a method approved by the Engineer. All equipment used for the application of water shall be equipped with a positive means of shutoff. If the Contractor elects to use water from the City water system, he shall make arrangements with the Public Utilities Department of the City of Riverside and pay for all water used.

312 "AS BUILT" DRAWINGS

After construction has been completed, "As Built" drawings will be submitted by the contractor showing the actual locations and stations of all valves, tees, and special fittings. Service connections to the main will be stationed on pipeline stationing. The contractor shall show lengths of installed services and stationing of service corp stops, and note any deviations from the original plans on the "As Built" drawings.

"As Built" drawings shall be prepared on a clean blueprint and shall be legibly marked in red ink.

400 ALTERNATE MATERIALS

400-2 UNTREATED BASE MATERIALS

400-2.3 Disintegrated Granite

Disintegrated granite (D.G.) base will only be allowed if the existing base on either side of the trench has previously been built using disintegrated granite. The minimum R-value of D.G. shall be 73.

PART 5 - TESTING & DISINFECTION
OF WATER MAINS & APPURTENANCES

5-1 General

All water mains and appurtenances shall be tested for pressure and leakage and shall be disinfected prior to acceptance by the City for domestic use.

Testing and disinfection of water mains and appurtenances shall be in accordance with the applicable A.W.W.A. Standards except as herein modified.

All testing and disinfection shall be made in the presence of the Engineer. The Contractor shall notify the Engineer not less than twenty-four (24) hours in advance of the actual time of testing and/or disinfection so that the Engineer may observe the procedure.

When the pressure test, leakage test, chlorination or bacteriological test fail to meet the requirement of the Specifications, the Contractor shall make necessary repairs, replacements or repetition of procedures to conform to the specified requirements at his own expense.

5-2 Pressure Test

All water mains and appurtenances shall be tested as described herein. The pressure test shall not be performed until the following conditions have been met:

- (1) In areas where a pavement surfacing is to be constructed, the pressure test shall be made only after other utilities such as, storm sewers, and sanitary sewers have been installed;
- (2) Curbs and gutters have been installed and the subgrade materials portion of the pavement area have been constructed to proper grade and all compaction tests have been approved by the City;
- (3) All services, fire hydrants, and other appurtenances have been installed and adjusted to final grade and location;
- (4) All concrete anchor and and thrust blocks shall have cured at least three (3) days.
- (5) Submittal of as-built drawings and all affidavits and certificates of compliance to the Inspector.

The pressure test shall be maintained on the test section not less than two (2) hours. The Contractor may at his convenience conduct a preliminary pressure test at any time prior to the City's pressure test. The results of the preliminary test will not be considered by the City.

The test pressure shall be the pipe class plus 50 psi as measured at the lowest elevation of the water main under test. No water pipeline shall be tested at less than 150 psi.

The amount of water main footage to be tested at one time shall be determined by the Engineer.

Each section of the water main to be tested shall be slowly filled with water from the nearest source by a means approved by the Engineer. The pipelines shall be filled with water and placed under a slight pressure for at least twenty-four (24) hours before the pressure test.

All air shall be vented from all high spots in the water main, fire hydrants and services before making and pressure test. If hydrants or other outlets are not available, taps shall be made at the high points to expel the air by the contractor at his own expense. These taps shall be capped by the Contractor after testing.

The test pressure shall be applied by means of a pump connected to the pipeline in a manner approved by the Engineer. The pump, pipe connections, bulkheads, pressure gages and other equipment, labor and materials required to perform the test shall be furnished by the Contractor.

The Engineer may check the test pressure by installing City pressure gages in place of the Contractor's gage. In case of a difference in pressure readings between gages, the City's gage reading shall govern.

All appurtenant facilities shall be tested at the same pressure and for the same duration as the mainline pipe.

All valves shall be tested for leak-proof tightness after the mainline pressure test with the test pressure on one side of the valve and atmospheric pressure on the other side.

Wet tap valve sleeves shall be hydrostatically pressure tested for a period of 1 hour at a test pressure of pipe class plus 50 psi, or air pressure tested for a period of 30 minutes at a test pressure of 80 psi. During and at the end of test, a solution of soapy water shall be applied at all joints to test for leakage. No pressure loss or leakage will be permitted.

5-3 Leakage Test

All water mains and appurtenances shall be tested as described herein.

The test pressure applied to the water main for the leakage test shall be maintained as constant as possible for not less than two (2) hours. The leakage test shall be held concurrently with the pressure test.

The length of fire hydrant laterals and service lines are not included in the footage in determining the allowable leakage.

All noticeable leaks shall be stopped regardless of the results of the test and defective pipe, fittings, valves, and other accessories discovered during the test shall be removed and replaced. Repair clamps of any kind or type are not allowed.

The allowable leakage volume shall not exceed the following:

(1) Asbestos Cement Pipe

30 gal/in. dia./mile/24 hours

(2) Ductile Iron and C.M.L. & C. Steel Pipe

15 gal/in. dia./mile/24 hours

The Contractor takes all responsibility for locating leaks and repairing damage to pipe bedding and backfill resulting from leaks discovered during the pressure leakage test.

The pump, pipe connection, measuring devices, gages and all other equipment, labor and materials required for performing the leakage test shall be furnished by Contractor. The Engineer may, however, use City's measuring device in place of Contractor's equipment. In case of a difference in the measured leakage rate between the measuring devices, the City's measured leakage shall govern.

5-4 Flushing

The new mains shall be flushed prior to chlorination. The flushing velocity to be obtained for pipes 12 inches and smaller shall not be less than 2.5 ft/sec. The Contractor shall make necessary arrangements to provide the minimum velocity. The Contractor shall take due precaution in providing for adequate drainage from the site. The minimum volume of water to be flushed, at required velocity, shall be not less than the 1.5 times the volume of the pipe line from the point of filling to the point of blow-off. The following table is a guide only. The Contractor should verify that proposed hydrants to be used have adequate pressure.

REQUIRED OPENINGS TO FLUSH PIPELINES
(40 psi Residual Pressure)

<u>Pipe Size</u>	<u>Flow Required to Produce 2.5 ft/sec</u>	<u>Orifice Diameter</u>	<u>Hydrant No.</u>	<u>Outlet Diameter</u>
INCHES	GPM	INCHES		INCHES
4	100	15/16	1	2-1/2
6	220	1-3/8	1	2-1/2
8	390	1-7/8	1	2-1/2
10	610	1-5/16	1	2-1/2
12	880	2-13/16	1	2-1/2

Flushing is no substitute for preventive measures. If, in the opinion of the Engineer, dirt which will not be removed by flushing enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with five (5) percent hypochlorite disinfecting solution.

It is the responsibility of the Contractor to remove the flushing water or the chlorinated water from the project area. The Contractor is responsible for any damage as a result of flushing operations.

The Contractor shall be aware that hydrant meters and backflow devices rented from the City have the following limitations:

2 inch backflow devices:	160 gpm
2 inch fire hydrant meter:	200 gpm

5-5 Disinfection

All newly laid water mains and appurtenances shall be disinfected in accordance with A.W.W.A. C-651, Disinfecting Water Mains, except as modified herein.

Disinfection shall be done after the pressure and leakage tests have been performed and accepted.

Chlorine used for disinfection must be liquid chlorine. (Gas at atmospheric pressure). Tablets or granular chlorine shall not be used. Safe handling practices contained in A.W.W.A. Manual M-20 shall be followed by the Contractor. Chlorine shall be applied by the continuous feed method as outlined in Sub-section 5.2 of A.W.W.A. C-651 except as may be modified by the Engineer.

Chlorine shall be applied at the beginning of the water main to be disinfected through a corporation stop installed for this purpose, through curb stop or through any other opening as may be required by the Engineer. Fire hydrants or air valves may not be used for this purpose.

Water used to convey the chlorine solution throughout the water main shall be obtained from the existing distribution system. The rate of flow shall be so controlled that water will flow slowly into the unsterile main during the application of chlorine.

The end of the main being chlorinated shall be kept open and running during the application of chlorine and until the desired chlorine concentration is reached, after which each curb stop, fire hydrant, air valve line or any other connection to the water main shall be individually opened and flushed with the chlorine solution. After the water main and all appurtenances thereto have been loaded with chlorine to the proper concentration, the water source, chlorine feeder and all other openings to the water main shall be closed. The initial minimum concentration shall not be less than fifty (50) milligrams per liter of chlorine.

The chlorine solution shall remain in the water main for not less than twenty-four (24) hours after which the treated water through the length of the main shall contain not less than twenty-five (25) milligrams per liter of chlorine.

The chlorine content of the water shall be tested by the Engineer and if found to be less than twenty-five (25) milligrams per liter after twenty-four (24) hours contact, the water main and appurtenances shall be rechlorinated and held for another twenty-four (24) hour period. No chlorination shall be started unless it can be completed by 1 p.m. on a Thursday.

During the period of chlorination, all main line valves and blow-off valves shall be operated to insure that the discs and seats are fully open to chlorinated water. Air valves, when required, shall be chlorinated separately under the direction of the Engineer.

Upon approval of the chlorine residual at twenty-four (24) hours by the Engineer, the chlorine solution shall be flushed from the water main through each service, fire hydrant and blow-off. Flushing shall continue until the chlorine residual is not more than five-tenths (0.5) milligrams per liter as determined by the Engineer, for a 24-hour period.

In no case shall a chlorine solution of over five-tenths (0.5) milligrams per liter be held in the main or appurtenances for more than five (5) days from the initial injection to the final flushing.

5-6 Bacteriological Tests

A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required, such that any residual chlorinating agent in the lining may dissipate. Following this period, the Contractor shall have a qualified laboratory approved by the City perform bacteriological tests. Samples shall be taken in the field by a laboratory technician or by a representative of an approved testing firm and transported to the laboratory. Such tests shall meet the Riverside County Health Department requirement for domestic water purposes. The required number and location of such samples will be as shown on the plans, or as designated by the Engineer, however, a minimum of one successful bacteriological test per 500 feet of main and/or a minimum of two samples per day will be required. All samples must indicate five tubes negative and have a standard plate count of less than 200. Passing samples will be required for two consecutive days.

All laboratory testing shall be at the Contractor expense. One copy of the test results shall be mailed directly to the Engineer from the Laboratory.

Upon successful completion of bacteriological testing, the pipeline may be accepted for use in the City system; however, standard policy is to accept the lines for use upon the City giving written Notice of Final Acceptance.

5-7 Contractor's Responsibility for Testing and Disinfection

Notwithstanding anything contained herein, it shall be the sole responsibility of Contractor to construct a water main capable of passing the pressure and leakage test and to effect a disinfection of the water main. The fact that City provides inspection during the construction and testing of the water facilities and receives laboratory testing results to determine the sterility of the water mains shall not abrogate Contractor's responsibility in this regard.

It shall also be the responsibility of Contractor to prevent the consumption of water for any and all uses from unsterile mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the unsterile main.

Contractor shall indemnify and save the City harmless from any suits, claims, or actions brought by any person or persons for, or on account of, any sickness or death sustained or arising out of the consumption of water from the main until final acceptance by the City.

5-8 Connections to Existing City Water Lines

No permanent connection between any Contractor installed water main and existing water mains shall be made by the Contractor, except for wet tapped water services larger than 2 inches and fire services.

Wet tapped connections with mechanical joint tapping sleeves shall be cleaned and disinfected in accordance with AWWA C-651, Sections 9 and 10. Work shall include treating trench with a hypochlorite solution, as deemed necessary by the Engineer; thoroughly cleaning the main to be tapped, and the interiors of the sleeve and tapping gate; and swabbing the tapping sleeve interior with a 1 percent hypochlorite solution.

Water required for initial filling, pressure testing, leakage testing, flushing and chlorination may be obtained from an existing City main or fire hydrant by use of a City Meter and an Approved Backflow Prevention Device.

All water must be measured through a City Meter. The Contractor may use his own Approved Backflow Prevention Device, however, it shall be approved by the City of Riverside Cross-Connection Technician before use. The Contractor shall not operate any gate valve on any existing main.

The Contractor shall pay all rental and deposit fees for fire hydrant meters or Backflow Prevention Devices checked out from the City plus charges for water used.

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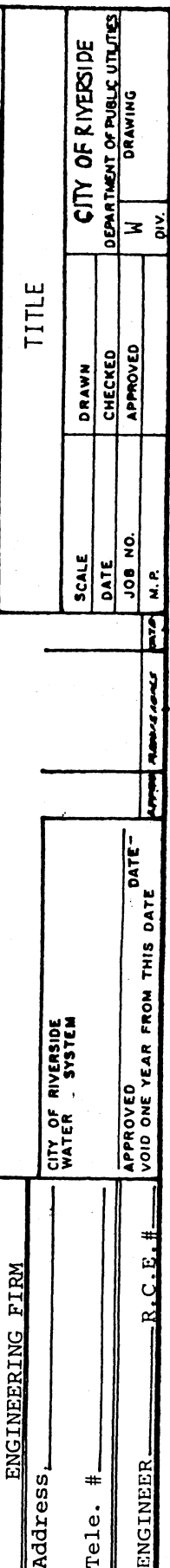
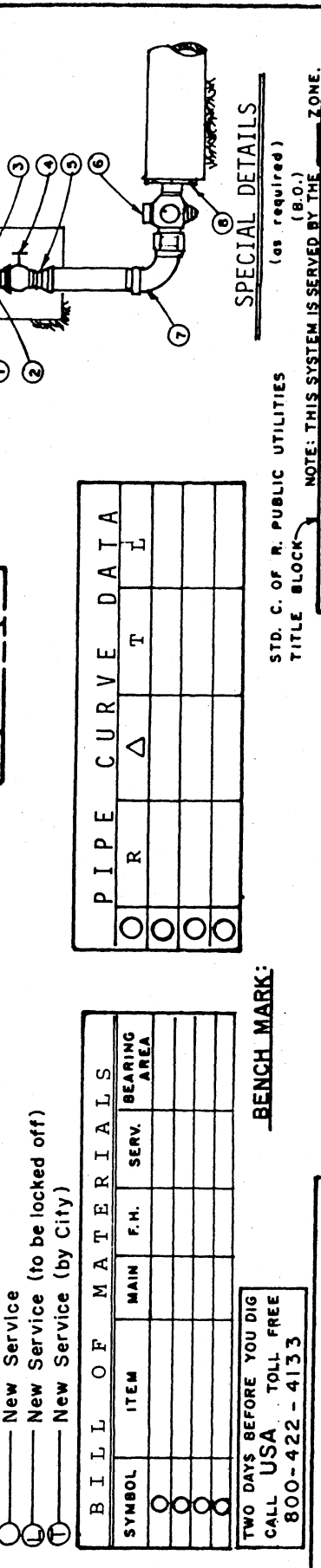
**CITY OF RIVERSIDE
PUBLIC UTILITIES DEPARTMENT
WATER DIVISION**

STANDARD DRAWINGS

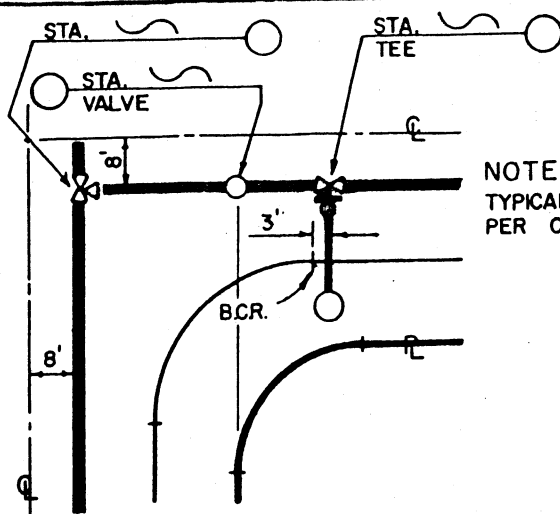
LEGEND
(as required)

- New A.C.P.
- New D.I.P.
- Tap Sleeve & Tap Gate Valve
- New Gate Valve
- New Cap (B.O.)
- New Elbow
- New Tee

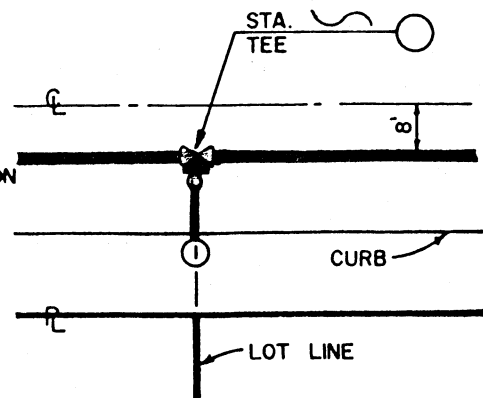
The diagram shows a main line with station numbers 1 through 53. The main line includes a New A.C.P. valve, a New D.I.P. valve, a Tap Sleeve & Tap Gate Valve, a New Gate Valve, and a New Cap (B.O.). The distribution network includes a New Elbow and a New Tee. The diagram is labeled with station numbers 1 through 53 and includes a legend for the symbols used.



DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0 R.K.	9/70	F.L.	<i>FL</i>	1 B.B.	9/77			2 M.M.C.	3/83	R.S.	
								3 GJB	7/87	R.S.	



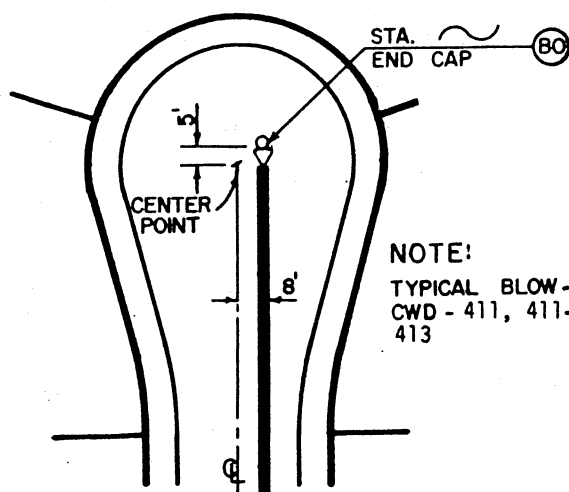
NOTE:
TYPICAL F.H. INSTALLATION
PER CWD - 700



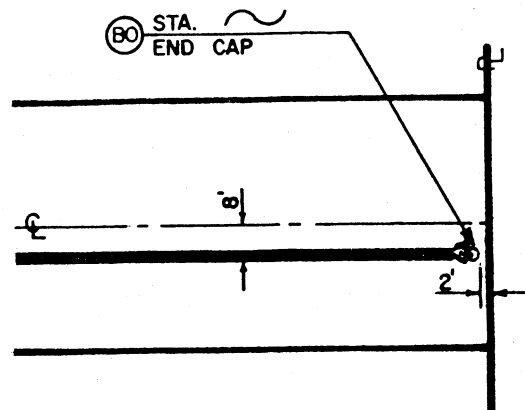
INTERSECTIONS

LOT LINES

F.H. LOCATIONS



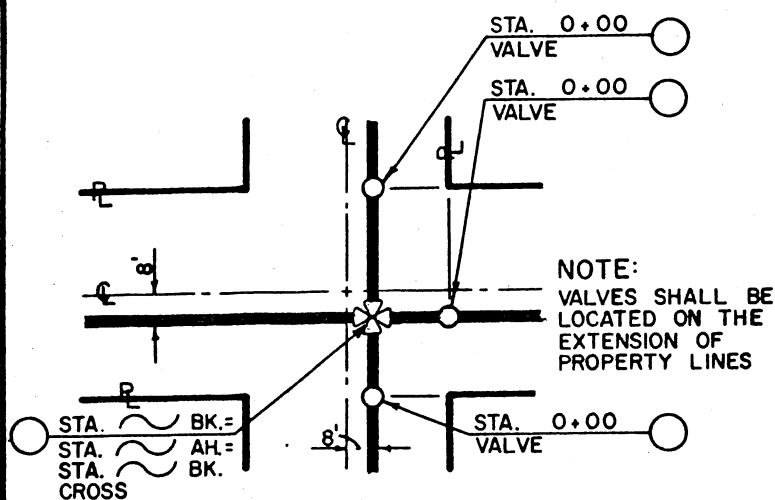
NOTE:
TYPICAL BLOW-OFFS PER
CWD - 411, 411-1, 412 OR
413



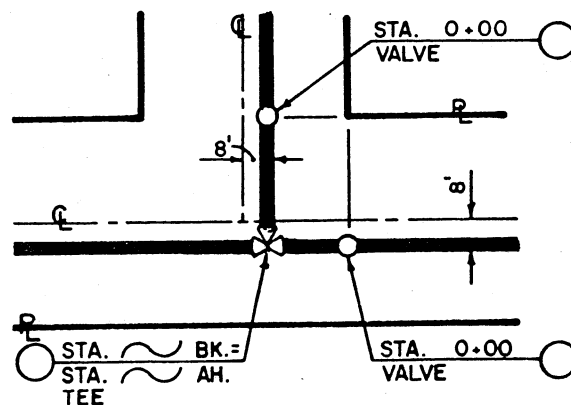
CUL - DE - SAC

DEAD END.

END OF MAIN



NOTE:
VALVES SHALL BE
LOCATED ON THE
EXTENSION OF
PROPERTY LINES



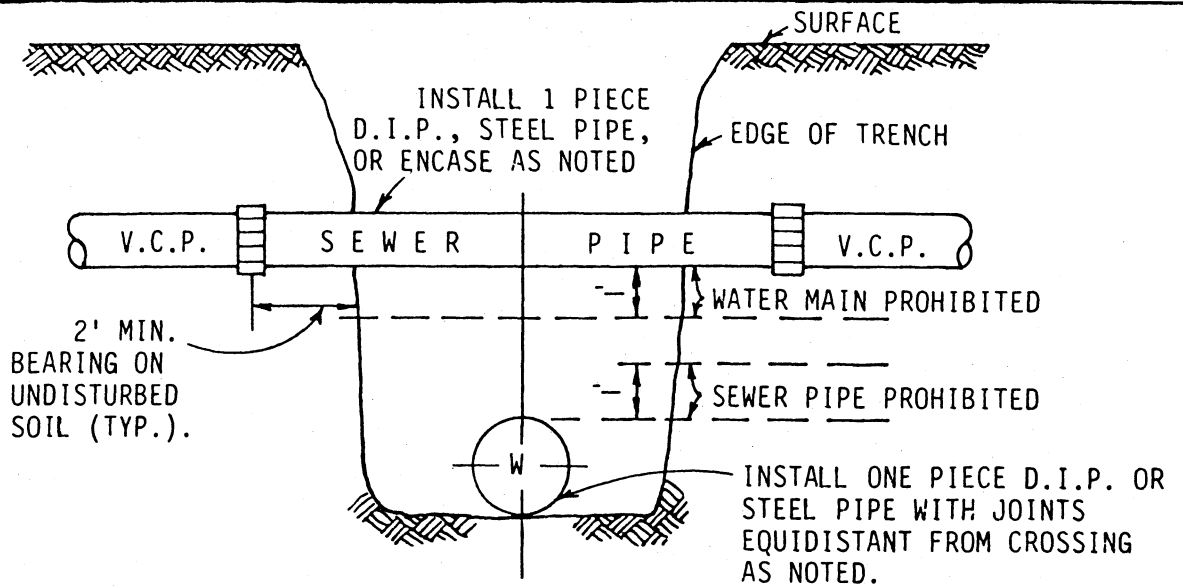
FOUR WAY

THREE WAY

VALVE LOCATIONS

WATER DISTRIBUTION AND TRANSMISSION CONSTRUCTION METHODS

TYPICAL PLAN LAYOUT



	CROSSING MAINS WITH WATER MAIN BELOW SEWER MAINS OR LATERALS		
	TYPE OF CONSTRUCTION		
VERTICAL CLEARANCE	NEW WATER AND NEW SEWER	NEW WATER AND EXISTING SEWER	NEW SEWER AND EXISTING WATER
1' to 3'	(1) INSTALL (WATER) D.I.P. FOR 18' OR STEEL PIPE FOR 20'+ SEWER O.D. AND (2) ENCASE TYPE B SEWER FOR 9' MIN.	(1) INSTALL (WATER) D.I.P. FOR 18' OR STEEL PIPE FOR 20'+ SEWER O.D. AND (2) ENCASE TYPE B SEWER FOR 6' MIN.	(1) INSTALL (SEWER) D.I.P. FOR 18' OR STEEL PIPE FOR 20'+ WATER O.D. AND (2) IF WATER IS LEAKING OR DAMAGED NOTIFY P.U. DEPT.
MORE THAN 3'	(1) INSTALL (WATER) D.I.P. FOR 18' OR STEEL PIPE FOR 20'+ SEWER O.D. (WATER).	(1) INSTALL (WATER) FOR 18' OR STEEL PIPE FOR 20'+ SEWER O.D.	(1) INSTALL (SEWER) D.I.P. FOR 18' OR STEEL PIPE FOR 20'+ WATER O.D. AND (2) IF WATER IS LEAK- ING OR DAMAGED NOTIFY P.U. DEPT.

GENERAL NOTES

- (1) INSTALL (WATER) D.I.P. DENOTES INSTALLATION OF DUCTILE IRON PIPE, A.W.W.A. C-151 MINIMUM THICKNESS CLASS 50, WITH PIPE LENGTH STRADDLING CROSSING. USE TRANSITION COUPLINGS TO A.C.P. AS SHOWN ON STANDARD CWD-022. D.I.P. MAY ONLY BE USED FOR 12" Ø OR SMALLER SEWER CROSSINGS.
- (2) INSTALL (SEWER) D.I.P. DENOTES (WATER) D.I.P. WITH BITUMINOUS D.I.P. COATING PER A.W.W.A. C-110.
- (3) ENCASE SEWER OR WATER DENOTES ENCASEMENT PER STD. DWG. CWD-023 AND -024 WITH THE MINIMUM LENGTH SPECIFIED STRADDLING THE CROSSING.
- (4) INSTALL STEEL PIPE DENOTES REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE, PER A.W.W.A. C-300, C-301, OR C-303.
- (5) ALL PIPE JOINTS SHALL BE EQUIDISTANT FROM CROSSING.

WATER DISTRIBUTION AND TRANSMISSION CONSTRUCTION METHODS

STRUCTURE INTERFERENCE
WATER MAIN UNDER SEWER

The diagram illustrates the typical installation of A.C.P. and V.C.P. pipes in a trench. The trench is shown with a cross-section and a plan view. The trench width is indicated as 2' MIN. PERP. TO TRENCH (TYP). The pipe is encased in a concrete or mortar bed, labeled TYPE A OR B ENCASEMENT. The trench is filled with COMPACT EARTH IN TRENCH UNDER ENCASEMENT AS REQUIRED IN SPECS. The diagram also shows A.C.P. COUPLINGS and TYPE D, F, OR G JOINT. The trench is shown with a cross-section and a plan view. The trench width is indicated as 2' MIN. PERP. TO TRENCH (TYP). The pipe is encased in a concrete or mortar bed, labeled TYPE A OR B ENCASEMENT. The trench is filled with COMPACT EARTH IN TRENCH UNDER ENCASEMENT AS REQUIRED IN SPECS. The diagram also shows A.C.P. COUPLINGS and TYPE D, F, OR G JOINT.

0	DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
4	R.K.	9/70	F.L.		1	MMG	1/81	MMG	2	MMG	3/83	MMG
4	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
M.L.	9/88				3	GJB	7/87		3	GJB	7/87	
DELETED YEAR: PUT LATEST REVISED GEN. NOTES 1, 2, 3 & 4. NOTES 6, 7, AND 8.												

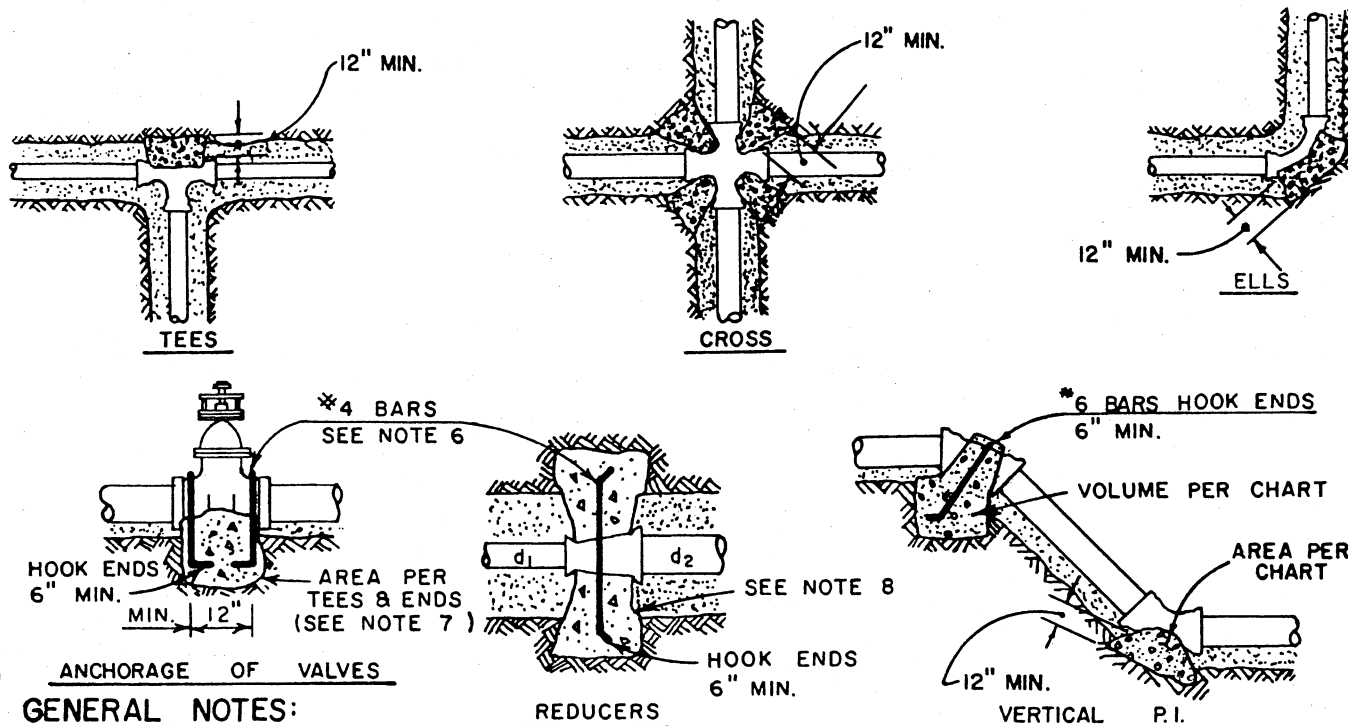
THRUST BLOCK BEARING AREA REQUIRED (SQ. FT.)

PRESSURE P = CLASS 150* + 50* HAMMER = 200*/in²

HORIZ. & VERT. P.I. BEARING AGAINST TRENCH (FT. ²)						VERTICAL P.I. ANCHOR VOL. OF CONC. (FT. ³)			
d	1 1/4°	22 1/2°	45°	90°	TEES ENDS	1 1/4°	22 1/2°	45°	90°
4"	1.0	1.0	1.0	2.0	1.5	3.5	6.5	13.0	24.0
6"	1.0	1.5	2.0	4.0	2.5	7.5	16.0	30.0	57.0
8"	1.0	2.0	4.0	7.0	5.0	12.0	26.0	52.0	95.0
12"	2.0	4.5	8.5	16.0	11.0	28.0	59.0	115.0	212.0

PRESSURE P = CLASS 200* + 67* HAMMER = 267*/in²

d	1.5	1.5	1.5	2.5	2.2	5.0	9.0	17.0	32.0
4"	1.5	2.0	2.5	6.0	3.5	10.0	21.5	40.0	76.0
6"	1.5	2.5	5.5	9.5	7.0	16.0	35.0	70.0	127.0
12"	2.5	6.0	11.5	21.0	16.0	38.0	79.0	155.0	283.0



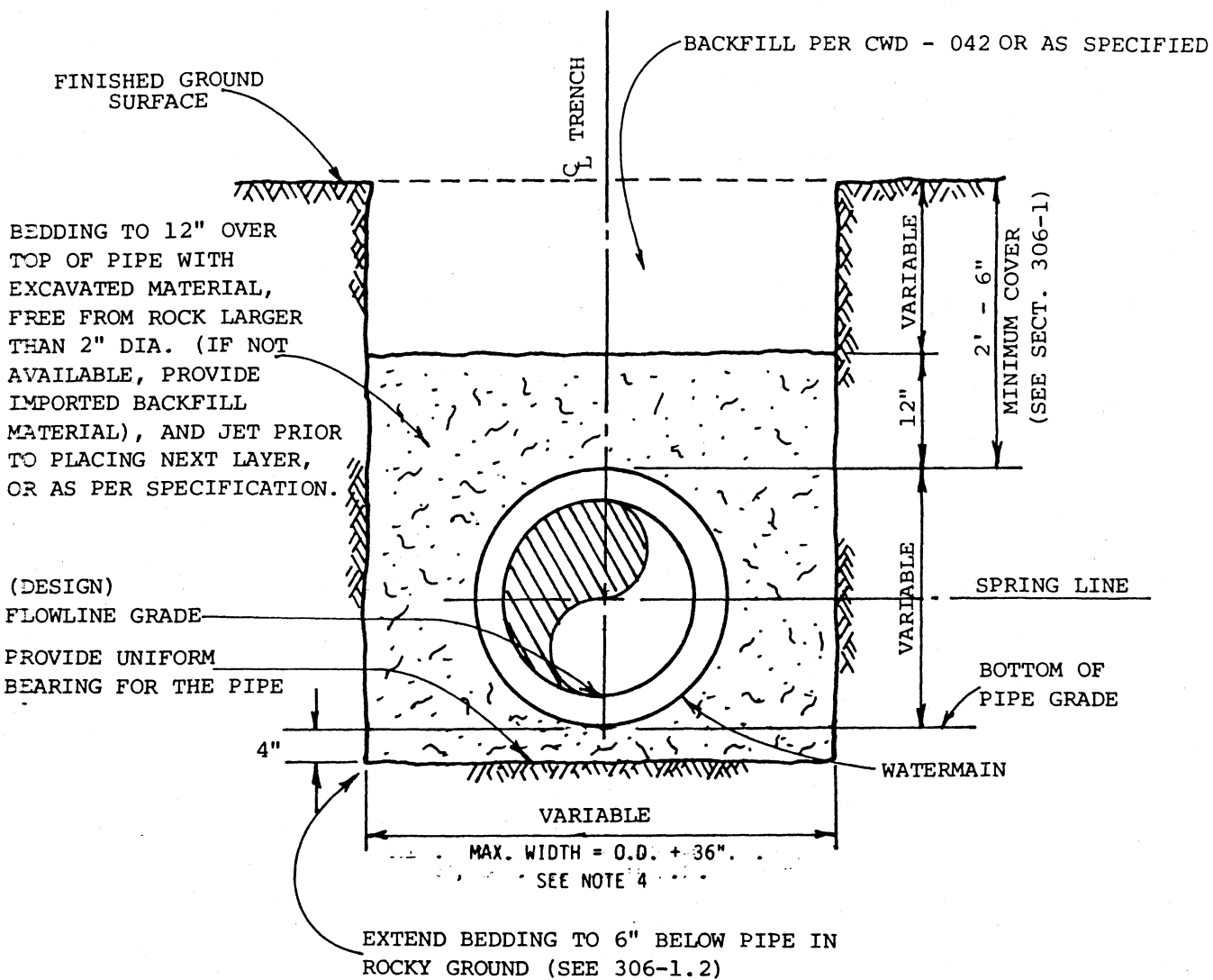
GENERAL NOTES:

- ALL MATERIALS OF CONSTRUCTION SHALL CONFORM TO "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION," AND STANDARD SPECIFICATION NO. 205.
- THRUST & ANCHOR BLOCKS SHALL BE OF P.C.C. 480-C-2000 CONCRETE & SHALL BE POURED (12" THICK MIN.) AGAINST UNDISTURBED SOIL. CONCRETE SHALL BE KEPT CLEAR OF PIPE AND THE BELL OF THE FITTINGS.
- THRUST BLOCK AREAS ARE BASED ON A 2,000 LB. PER SQ. FT. BEARING VALUE.
- SPECIFICATION NO. 205 REFERENCE, SECTION 2-6, 3-9, & 306-10.
- APPROVED RESTRAINED JOINTS MAY BE USED IN LIEU OF THRUST BLOCKS.
- EXTEND ALL REINFORCEMENT TO WITHIN 3 INCHES OF TRENCH KEY WALLS.
- ANCHOR BLOCK FOR GATE VALVES SHALL BE KEYED 1 FT. INTO TRENCH WALL AND 6 INCHES INTO BOTTOM OF TRENCH.
- REDUCER THRUST BLOCK AREA SHALL BE PER TEES AND ENDS FOR d₂ - d₁, AGAINST UNDISTURBED SOIL.

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

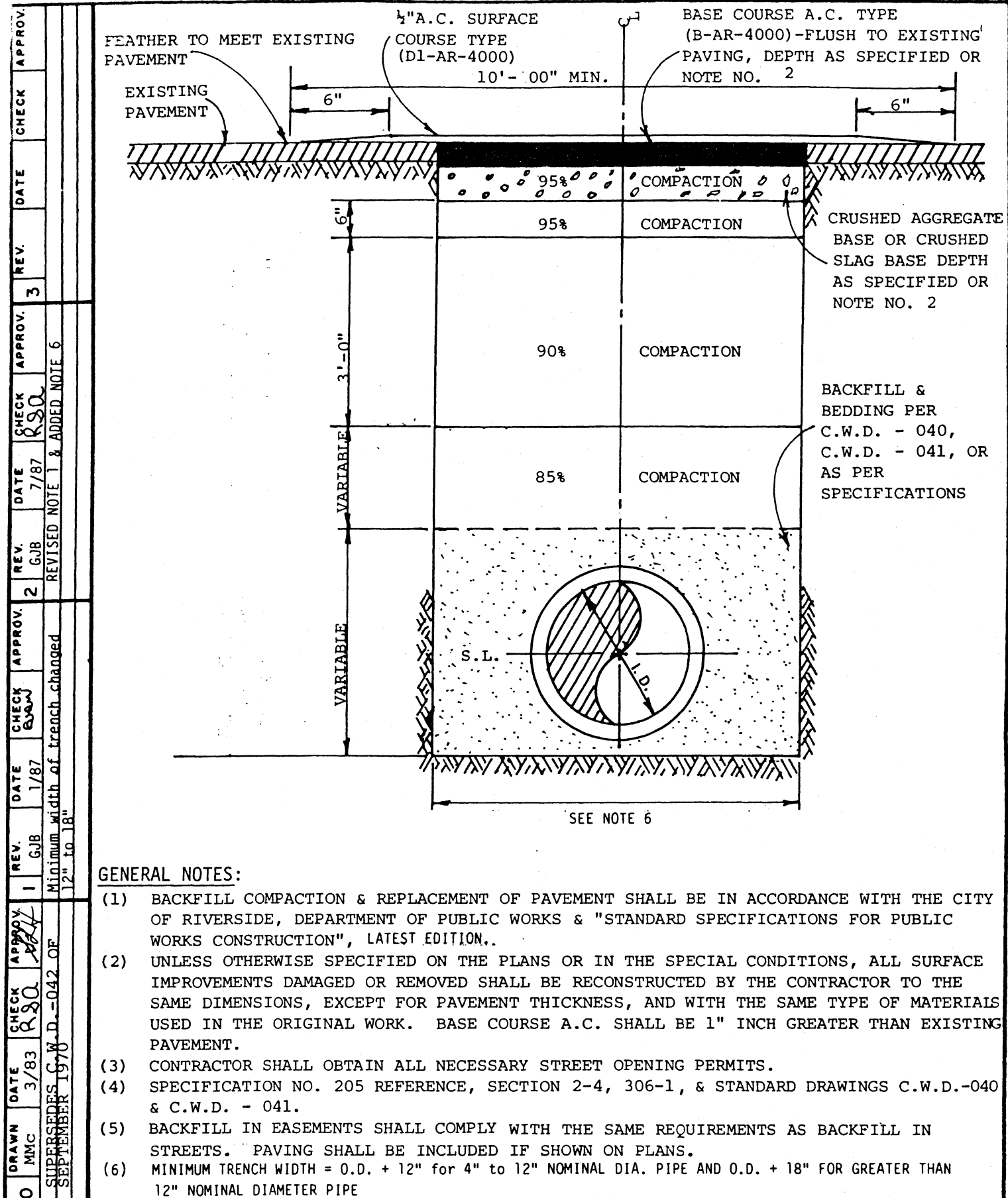
THRUST BLOCK DETAILS FOR
4", 6", 8", & 12" D.I. FITTINGS

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	MMG	3/83	BSA	1	1/87	BSA	2	2	7/87	BSA	3
SUPERCEDES C.W.D. 040 OF											
SEPT 1970											
MIN. WIDTH OF TRENCH											
CHANGED 12" TO 18" AND ADDED											
TO TITLE											
ADDED NOTE 4											



GENERAL NOTES:

- 1) THE MATERIAL USED IN BEDDING SHALL BE COHESIONLESS SANDY LOAM, SAND, OR SANDY GRAVEL MATERIAL OBTAINED FROM REQUIRED EXCAVATION OR FROM APPROVED BORROW AREAS. IT SHALL NOT CONTAIN ANY ROCKS OR OTHER HARDER MATERIAL DETRIMENTAL TO GOOD BEDDING OF THE PIPE OR THAT MIGHT BE DAMAGING TO THE PIPE COATING.
- 2) SAND BEDDING SHALL BE USED WHEN THE SAND EQUIVALENT OF THE NATIVE MATERIAL IS LESS THAN 30 PER ASTM D - 2419.
- 3) SPECIFICATION NO. 205 REFERENCE, SECTIONS 2-4 & 306-1.
- 4) MINIMUM TRENCH WIDTH = O.D. + 12" FOR 4" TO 12" NOMINAL DIAMETER PIPE AND O.D. + 18" FOR GREATER THAN 12" NOMINAL DIAMETER PIPE.

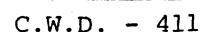


GENERAL NOTES:

- (1) BACKFILL COMPACTION & REPLACEMENT OF PAVEMENT SHALL BE IN ACCORDANCE WITH THE CITY OF RIVERSIDE, DEPARTMENT OF PUBLIC WORKS & "STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION", LATEST EDITION..
- (2) UNLESS OTHERWISE SPECIFIED ON THE PLANS OR IN THE SPECIAL CONDITIONS, ALL SURFACE IMPROVEMENTS DAMAGED OR REMOVED SHALL BE RECONSTRUCTED BY THE CONTRACTOR TO THE SAME DIMENSIONS, EXCEPT FOR PAVEMENT THICKNESS, AND WITH THE SAME TYPE OF MATERIALS USED IN THE ORIGINAL WORK. BASE COURSE A.C. SHALL BE 1" INCH GREATER THAN EXISTING PAVEMENT.
- (3) CONTRACTOR SHALL OBTAIN ALL NECESSARY STREET OPENING PERMITS.
- (4) SPECIFICATION NO. 205 REFERENCE, SECTION 2-4, 306-1, & STANDARD DRAWINGS C.W.D.-040 & C.W.D. - 041.
- (5) BACKFILL IN EASEMENTS SHALL COMPLY WITH THE SAME REQUIREMENTS AS BACKFILL IN STREETS. PAVING SHALL BE INCLUDED IF SHOWN ON PLANS.
- (6) MINIMUM TRENCH WIDTH = O.D. + 12" for 4" to 12" NOMINAL DIA. PIPE AND O.D. + 18" FOR GREATER THAN 12" NOMINAL DIAMETER PIPE

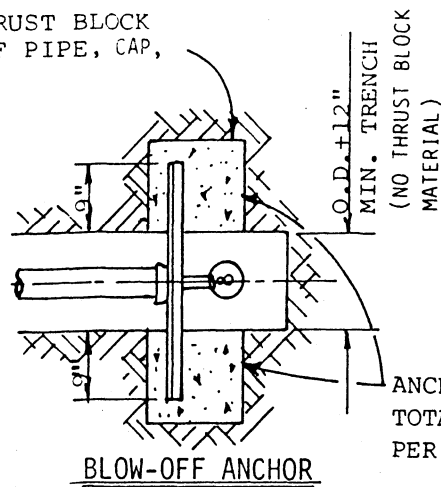
WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

BACKFILL & PAVEMENT
RESTORATION REQUIREMENTS



DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	3/83	R2A	222	1	7/87	R2A	2	3			
SUPERSEDES C.W.D.-411-1 OF MARCH 1973 REVISED BLOW-OFF ANCHOR NOTES & ADDED "NO JOINTS" TO NO. 9											

KEEP THRUST BLOCK
CLEAR OF PIPE, CAP,
& TRENCH

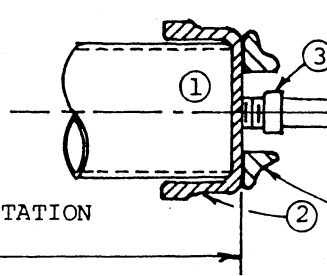


ANGLE SCHEDULE		
PIPE SIZE	PRESSURE CLASS	
	150#	200#
6 IN.	2½x2½x½	3x3x ¾
8 IN.	3½x3½x ¾	4x4x ¾
10 IN.	4x4x½	5x5x½
12 IN.	5x5x½	5x5x½

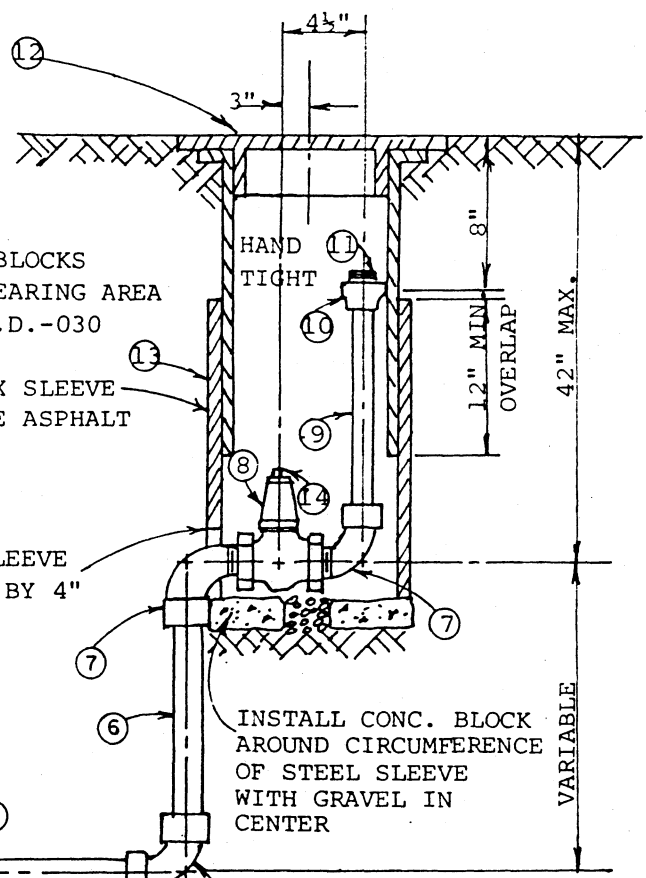
ANCHOR BLOCKS
TOTAL BEARING AREA
PER C.W.D.-030

GATE BOX SLEEVE
SHALL BE ASPHALT
DIPPED

NOTCH SLEEVE
6" HIGH BY 4"
WIDE



END OF WATER MAIN STATION
AS SHOWN ON PLANS



INSTALL CONC. BLOCK
AROUND CIRCUMFERENCE
OF STEEL SLEEVE
WITH GRAVEL IN
CENTER

BILL OF MATERIALS

ITEM	STOCK #	QUANTITY
① 4" THRU 12" MAIN	PER W.O.	
② MAIN SIZE CAP OR PLUG X 2" TAP I.P.F.	PER W.O.	1
③ 2" ADAPTER I.P.M. X S.W.	41525	1
④ 2" X 12" COPPER PIPE, SOFT	45003	1
⑤ 2" 90° ELL SW. X SW.	42624	1
⑥ 2" COPPER PIPE, SOFT	45003	VARIABLE
⑦ 2" 90° BRASS ELL IPM X S.W.	42710	2
⑧ 2" BRONZE GATE VALVE	44204	1
⑨ 2" X 18" COPPER PIPE, HARD (NO JOINTS)	45018	1
⑩ 2" ADAPTER SW. X I.P.F.	41527	1
⑪ 2" GALV. PLUG	45708	1
⑫ 10" GATE BOX LID & SLIP SLEEVE	C.W.D.-515	1
⑬ 10" STEEL SLEEVE (VARIES)	45042	1
⑭ 1" SQ. NUT AND STEM NUT FOR VALVE	SUPPLIED BY CITY	

- GENERAL NOTES:
- SPEC. NO. 205 REFERENCE SECTION 2-10, 3-5, & 306-10
 - INSTALL JOINT COUPLING 3'-3" FROM END STA. ON A.C.P., END WITH BELL ON S.I.P.
 - WHEN THE CENTER LINE OF THE MAIN IS LESS THAN 42" BELOW THE FINISHED GROUND SURFACE, USE C.W.D. 411
 - ALTERNATE MATERIAL FOR ② FLEXIBLE END CAP COUPLINGS, ROCKWELL TYPE 481

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

TYPICAL 2" BLOW-OFF
ASSEMBLY FOR MAINS WITH MORE
THAN 42" OF COVER

CWD. - 412

GROUND SURFACE

2-ASTM-A36 STEEL ANCHORS \angle 5" W/THRUST BLOCKS PER C.W.D.-0.

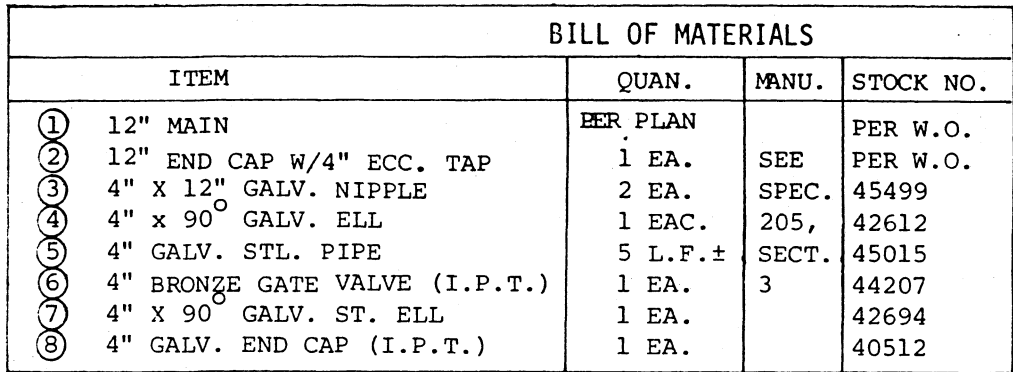
BILL OF MATERIALS			
ITEM	QUAN.	MANU.	STOCK NO.
① 12" MAIN	PER PLAN		PER W.O.
② 12" END CAP W/4" ECC. TAP	1 EA.	SEE	PER W.O.
③ 4" X 12" GALV. NIPPLE	2 EA.	SPEC.	45499
④ 4" x 90° GALV. ELL	1 EAC.	205,	42612
⑤ 4" GALV. STL. PIPE	5 L.F.±	SECT.	45015
⑥ 4" BRONZE GATE VALVE (I.P.T.)	1 EA.	3	44207
⑦ 4" X 90° GALV. ST. ELL	1 EA.		42694
⑧ 4" GALV. END CAP (I.P.T.)	1 EA.		40512

GENERAL NOTES:

(1) CONTRACTOR SHALL LEAVE END CAP IN PLACE UNTIL FINAL TIE-IN

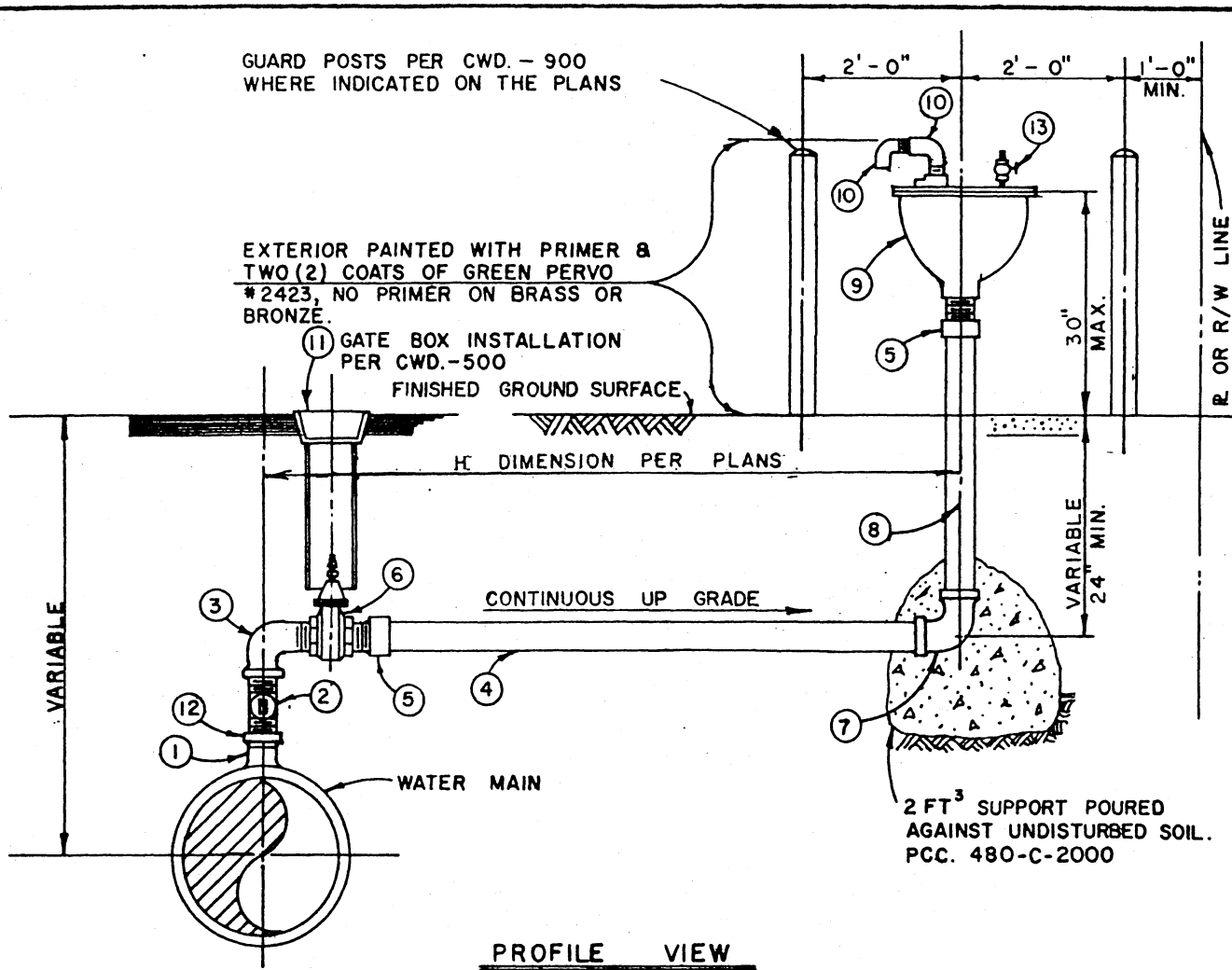
(2) SPECIFICATION NO. 205 REF., SECTION 2-10, & 306-10.

(3) FLEXIBLE END CAP COUPLINGS, ROCKWELL TYPE 481, MAY BE USED MATERIAL FOR ITEM ② .



- (1) CONTRACTOR SHALL LEAVE END CAP IN PLACE UNTIL FINAL TIE-IN BY CITY FORCES.
- (2) SPECIFICATION NO. 205 REF., SECTION 2-10, & 306-10.
- (3) FLEXIBLE END CAP COUPLINGS, ROCKWELL TYPE 481, MAY BE USED AS AN ALTERNATE MATERIAL FOR ITEM (2) .

DATE	2/71	CHECK	F.L.	APPROV.	DATE	1/72	CHECK	F.L.	APPROV.	DATE	3/83	CHECK	F.L.	APPROV.	DATE	7/87	CHECK	F.L.	APPROV.
D.T.	2/71	1	1/72	1	1/72	1	1/72	1	1/72	1	3/83	1	3/83	1	3/83	1	7/87	1	7/87
TRANSMISSION DWG.										LOCATION OF 2" G.V.									
REVISED BILL OF MATERIAL & ADDED H DIMENSION.										DELETED ARROW TO 2" COPPER LATERAL FROM (8)									



BILL OF MATERIAL		
ITEM	STOCK NO.	QUAN.
(1) 2" OR * 2 1/2" IPT OUTLET	PER CWD.-340	
(2) 2" BRONZE CORP. STOP STD.	41309	1
(3) 2" BRASS STREET ELL.	42760	1
(4) 2" TYPE K COPPER PIPE	45003	VARIABLE
(5) 2" SW X IPM BRONZE ADAPTER	41525	2
(6) 2" BRONZE GATE VALVE NRS	44204	1
(7) 2" SW X SW 90° ELL	42624	1
(8) 2" HARD DRAWN COPPER PIPE	45018	VARIABLE
(9) 2" CRISPIN UNIVERSAL AIR & VAC. VALVE	40027	1
(10) 2" GALV. STREET ELL	42691	2
(11) 8" GATE BOX	CWD-515	1 ea.
(12) * 2 1/2" X 2" NYLON BUSHING AS REQUIRED PER SPECS.	REQ.	1
(13) 1/4" BRASS GATE VALVE, 1/4" BRASS PLUG & 1/4" X 2" BRASS NIPPLE.	44215, 45760 45534	1 ea.

NOTES:

(1) A 1/16" SQ GALV. MESH SCREEN SHALL BE SOLDERED INTO OPEN ST. ELL.

(2) STATION, LOCATION & SPECIAL NOTES PER PLAN & PROFILE SHEETS.

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

TYPICAL 2" AIR VALVE
INSTALLATION

8" CAP MANUFACTURED BY SOUTH BAY FOUNDRY, SAN DIEGO, CA., OR APPROVED EQUAL. CAP MARKED C.W.D. PAINTED W/RED LEAD PRIMER.

FINISHED GROUND SURFACE

8" SLIP SLEEVE AND GATE BOX PIPE PER C.W.D. - 515

18"

2" SQ. OPERATING NUT

7" O.D. x $\frac{1}{4}$ " R.L. TACK

WELDED TO SHAFT EXTENSION

VARIABLE

SPOKED WHEEL

CENTER & PLUMB OVER OPERATING NUT

ADAPT TO OPERATING NUT ON VALVE

SHAFT EXTENSION REQUIRED WHERE TOP OF VALVE IS 3.5' MIN. BELOW FINISH GROUND SURFACE ($1\frac{1}{4}$ " DIA. STD. BLACK PIPE PAINTED W/PRIMER AFTER FABRICATION).

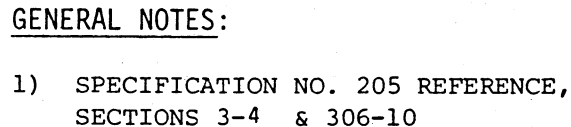
VALVE SIZE, STATION, & LOCATION AS SHOWN ON PLAN & PROFILE SHEETS.

THRUST BLOCK PER C.W.D. - 030.

GENERAL NOTES:

- 1) FOR 2" GATE & PIPING (AND FOR ALL COPPER PIPING), THE GATE BOX SLEEVE SHALL EITHER BE NOTCHED OR BLOCKED TO CLEAR SAME.
- 2) SPECIFICATION NO. 205 REFERENCE, SECTIONS 3-4 & 306-10

DI
RIVERS



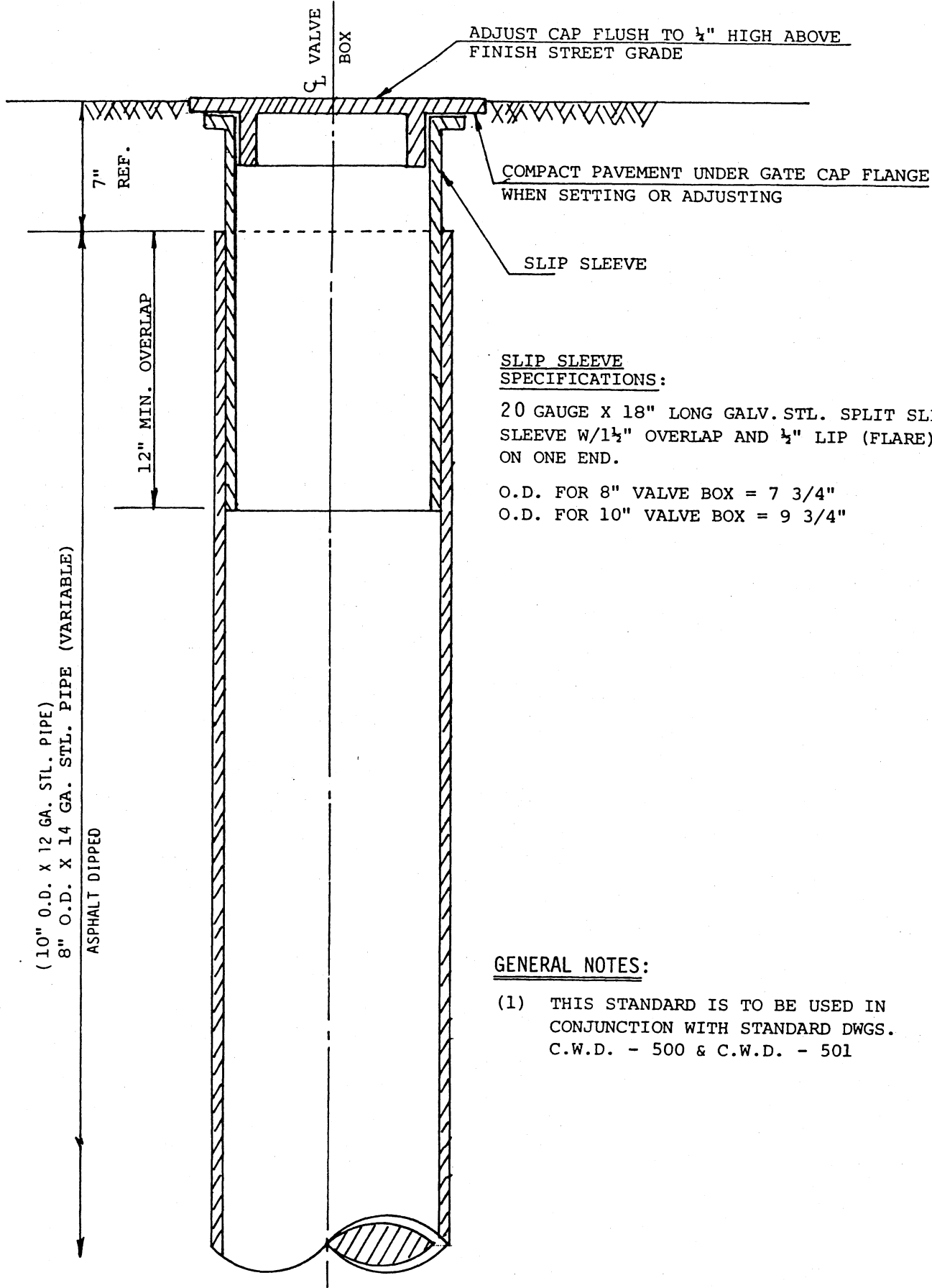
TYPICAL VALVE BOX FOR
GATE VALVES
8" & LARGER

C.W.D. - 501

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	M.M.C. 3/83	RSA	RSA	1	GJB 7/87	RSA	RSA	2	M.L. 9/88	RSA	RSA
SUPERCEDES C.W.D. - 515 OF											
DECEMBER 1971											
REVISED GATE BOX MATERIAL NOTE											
REVISED SLIP SLEEVE GAUGE											

(10" O.D. X 12 GA. STL. PIPE)
8" O.D. X 14 GA. STL. PIPE (VARIABLE)

ASPHALT DIPPED

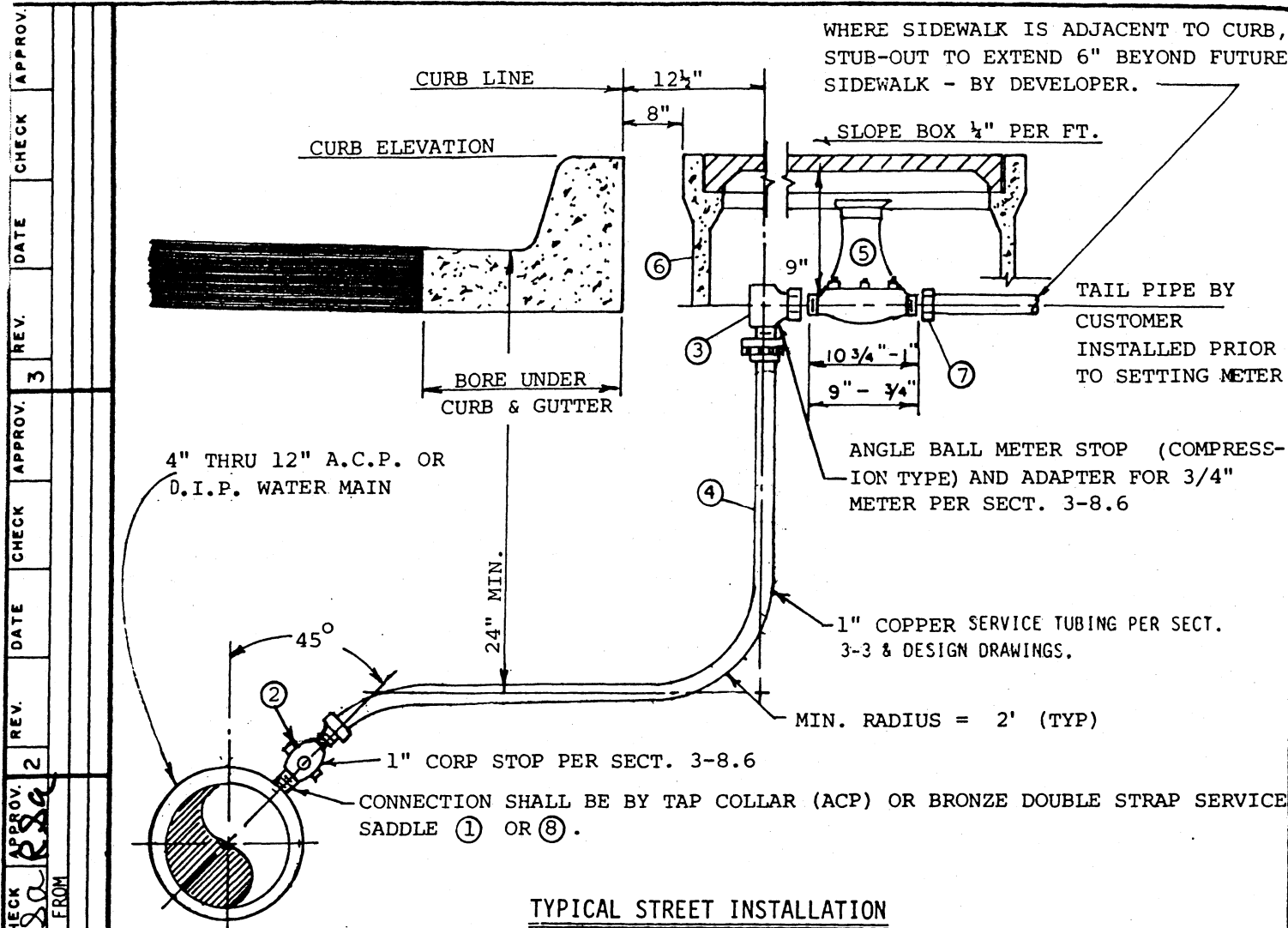


GENERAL NOTES:

- (1) THIS STANDARD IS TO BE USED IN CONJUNCTION WITH STANDARD DWGS. C.W.D. - 500 & C.W.D. - 501

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

TYPICAL SPLIT - SLEEVE RISER
FOR 8" & 10" VALVE BOX



TYPICAL STREET INSTALLATION

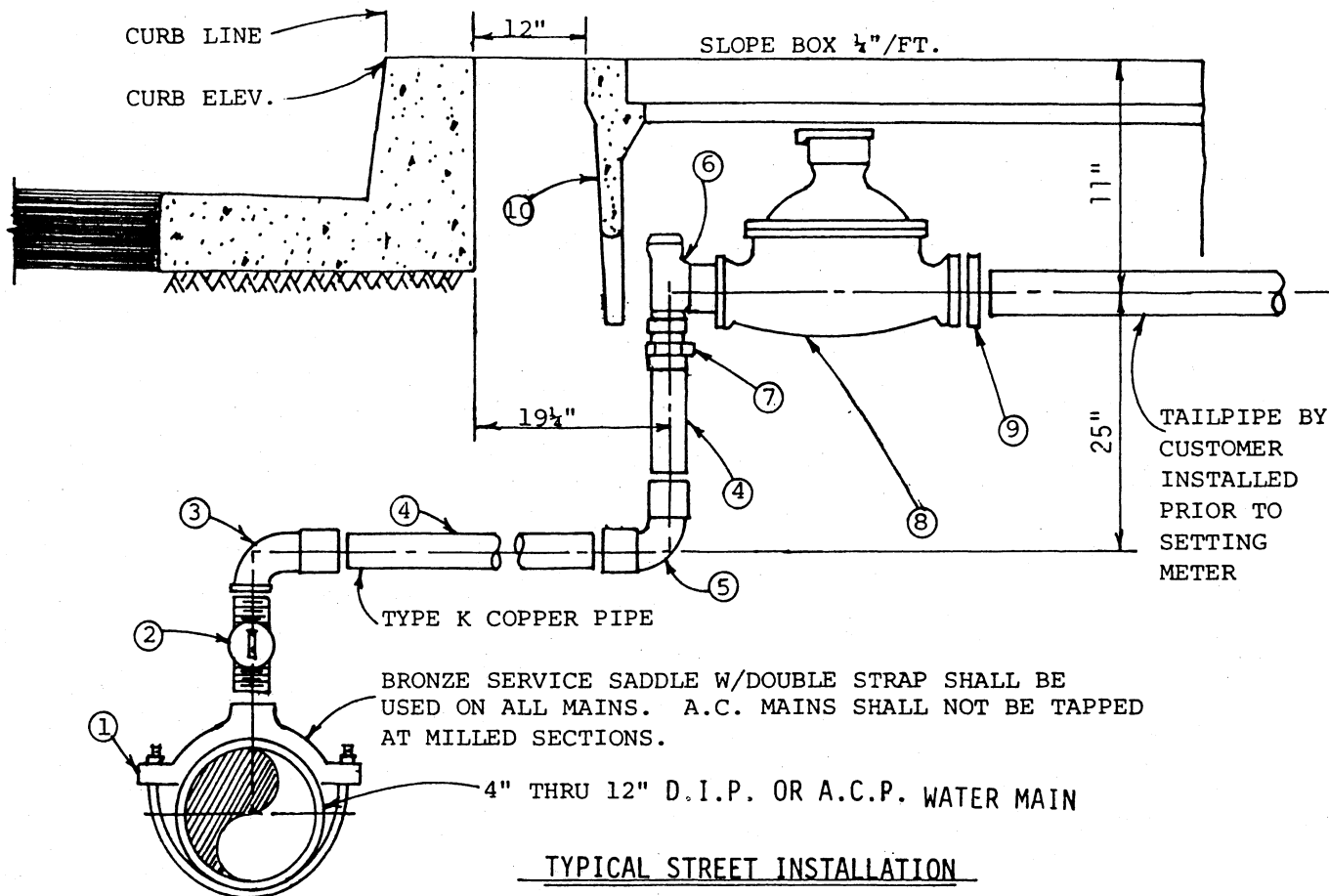
B I L L O F M A T E R I A L S

ITEM	CITY NO.	QUANTITY
① 1" HEAVY BRONZE TAPPED COUPLINGS FOR ACP (cc)	PER W. O. #	1
② 1" CORPORATION STOP THREAD X TUBING	1320 & 1321	1
③ ANGLE METER STOP TUBING X MTR COUPLING 1" (W/1" X 3/4" ADAPTOR FOR 3/4" METER)	0141(0140)	1
④ 1" TUBING (COPPER)	5002	VAR.
⑤ METER INSTALLED BY CITY FORCES	- - -	
⑥ METER BOX PER 205 SPEC. SECT. 3-8.4	4505	1
⑦ 1" OR 3/4" METER COUPLINGS	4700-03,4715	1
⑧ 1" BRONZE SERVICE SADDLE (IPT)	PER W. O. #	1

- NOTES:**
- (1) METER BOX COVER TO BE CAST IRON WHERE BOX IS IN ALLEY OR DRIVEWAY.
 - (2) CONTRACTOR SHALL INSTALL METER BOXES AT TIME ANGLE METER STOPS ARE INSTALLED.
 - (3) APPROVED EQUALS TO MATERIAL SPECIFIED HEREON ARE CONTAINED IN SPEC. 205.
 - (4) SPEC. NO. 205 REFERENCE, SECTIONS 2-9, 3-3, AND 3-8.
 - (5) CITY WILL FURNISH A TEMPORARY SERVICE METER JUMPER, PRIOR TO INSTALLING METER, UPON PAYMENT OF FEES.

DRAWN: MMC
 DATE: 3/83
 CHECK: RSO
 APPROV: [Signature]
 REV: 1
 GJB
 DATE: 7/87
 CHECK: RSO
 APPROV: [Signature]
 REV: 2
 DELETED POLYETHYLENE FROM STANDARD
 SUPERCEDES C.W.D. - 600 OF OCTOBER 1980

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	3/83	680	680	1	7/87	680	680	2			
SUPERSEDES C.W.D.-601 OF DELETED EXTENSION & REVISED METER LOCATION											



BILL OF MATERIALS

ITEM	STOCK #	QUAN.	SECTION
① BRONZE SERVICE SADDLE (MUELLER) (IPT)	PER W.O.	1	3-8.7
② 2" BRONZE CORP. STOP IPM x IPM	1309	1	3-8.6
③ 2" I.P.F./SW BRASS 90° ELL	2625	1	3-8.6
④ 2" TYPE K COPPER PIPE (SOFT)	5003		3-3.2
⑤ 2" SW/SW COPPER 90° ELL	2624	1	3-3.2
⑥ 2" ANGLE BALL METER STOP (IPF x METER FLG)			3-8.6
⑦ 2" COUPLING (COMP x IPM)		1	3-8.6
⑧ 1 1/2" or 2" METER (INSTALLED BY CITY)		1	3-8.6
⑨ 1 1/2" OR 2" METER FLANGE (FURNISHED BY CITY)	4050,4051	1	
⑩ METER BOX	4504	1	3-8.4
CONCRETE COVER 2 PC OR	4542,4553		
STEEL COVER 2 PC	4556		

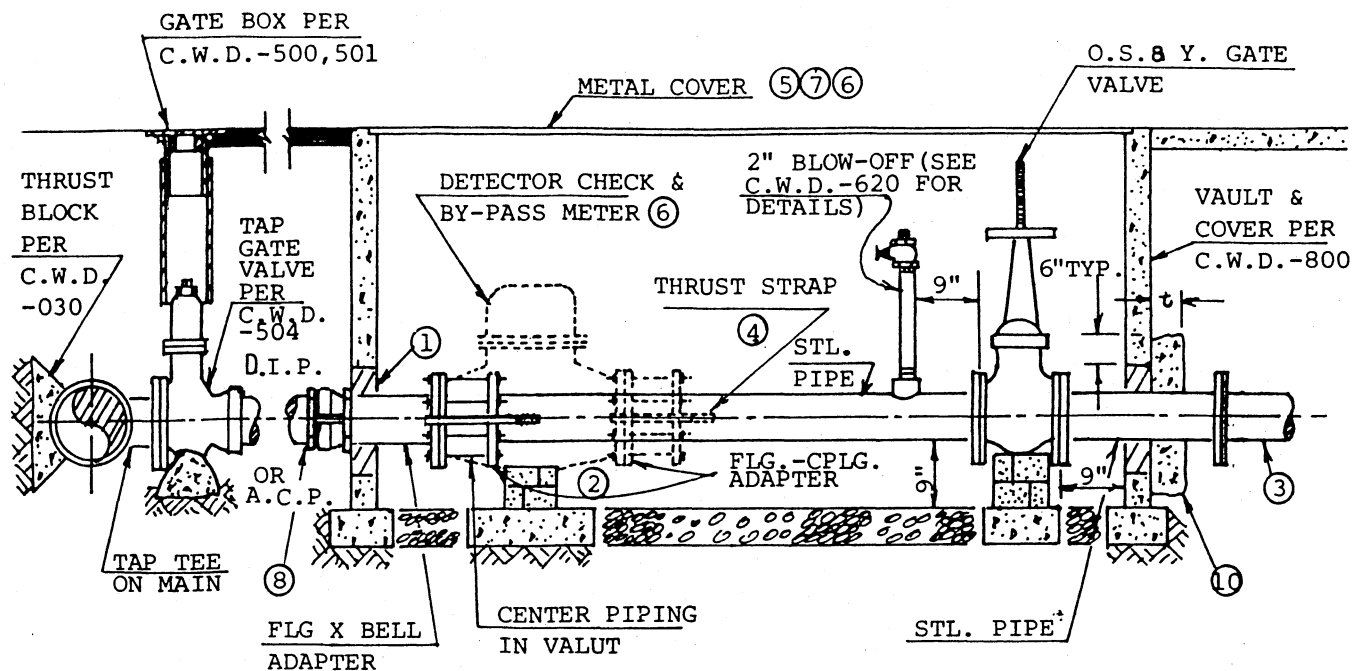
GENERAL NOTES:

- (1) SPECIFICATION NO. 205 REFERENCE SECTIONS 2-9, 3-8, 306-10.
- (2) A STEEL METER BOX COVER REQUIRED IN AN ALLEY OR DRIVE WAY.
- (3) DOUBLE GASKETS SHALL BE USED ON EACH SIDE OF METER SPACER UNTIL METER IS INSTALLED BY CITY.

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

2" COPPER WATER SERVICE

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
O MMC	3/83	RSQ	MM	1	7/87	RSQ	RSQ	2			
SUPERSEDES C.W.D.-610-1 OF 5/72											
Revised Note 9											



NOTES:

- ① DRY PACK PIPE OPENINGS
- ② SUPPORT DETECTOR CHECK & GATE ON CONCRETE PAD WITH CONCRETE BLOCKS & WOOD SHIMS.
- ③ BY CUSTOMER FROM FLANGE END.
- ④ PROVIDE 2-1½" X ½" THRUST STRAPS AT C OF PIPE.
- ⑤ ADJUST VAULT & COVER TO MEET SIDEWALK & CURB GRADE.
- ⑥ CONTRACTOR SHALL INSTALL ALL PIPE, FITTINGS, & MATERIALS BETWEEN THE TAP GATE & "PIPING BY CUSTOMER", INCLUDING TEMPORARY FLG. COUPLING CONNECTION AT THE DETECTOR CHECK LOCATION UNLESS OTHERWISE SHOWN ON THE PLANS. CITY FORCES WILL FURNISH & INSTALL DETECTOR CHECK, AND FABRICATE METER READING LID.
- ⑦ PIPING & METAL VAULT COVER SHALL BE PAINTED PER SECTION 310.
- ⑧ PROVIDE JOINT RESTRAINT, "STAR SUPPLY CORP" OR APPROVED EQUAL.
- ⑨ REFER TO SECTIONS 2-9, and 3 (Alt)
- ⑩ POUR P.C.C. 480-c-2000 CONCRETE THRUST COLLAR AGAINST WALL OF VAULT. COLLAR THICKNESS (t) = 8" FOR 10" SERVICES AND 6" FOR ALL REMAINING SERVICES.
- ⑪ SEE CWD-610-2 FOR MATERIALS CALL OUT.

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

FIRE SERVICE
4" THROUGH 10"

CITY OF RIVERSIDE

BILL OF MATERIAL

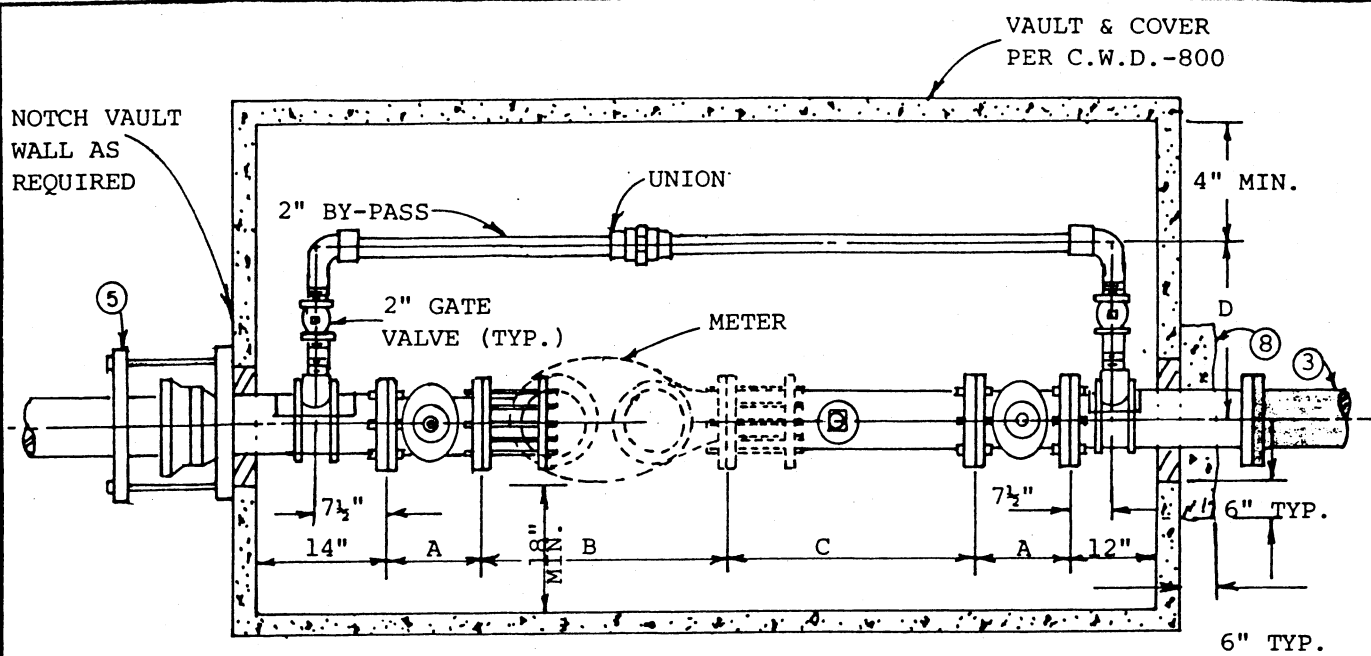
ITEM.	STOCK NO. / SIZE				QUAN.
	4"	6"	8"	10"	
FLANGE / BELL ADAPTER X 12"	0100	0098	0118	0111	1
DETECTOR CHECK & BY-PASS	4450	4451	4452	4453	1
FLANGE COUPLING ADAPTER	4707	4708	4709	4710	1
2" GALV. COUPLING	1509	1509	1509	1509	1
2" X 12" GALV. NIPPLE	5445	5445	5445	5445	1
2" GATE VALVE	4204	4204	4204	4204	1
2" GALV. PLUG	5708	5708	5708	5708	1
STEEL PIPE (SCHEDULE 40)	5016	5019	5020	5021	8'±
WELDING FLANGE	4022	4005	4006	4009	1
O. S. & Y. GATE VALVE	4430	4431	4432	4433	1
TAP TEE (MAIN X SIZE)	P E R W O R K O R D E R				1
TAP GATE VALVE (C)	4401	4402	4403	4404	1
DUCTILE IRON PIPE	5027	5028	5029	5030	36'±
GATE BOX CAPS	4275	4275	4276	4276	1
NUTS, BOLTS & GASKETS					5 sets
VAULT & COVER PER C.W.D.-800	3 TIERS	3 TIERS	4 TIERS	4 TIERS	
4' X 16" VAULT SECTION	4567	4567	4567	4567	6 / 8
8' X 16" VAULT SECTION	4568	4568	4568	4568	6 / 8
3 PIECE COVER	4569	4569	4569	4569	1
GRAVEL					16 FT ³
CONCRETE PCC-480-C-2000					15 FT ³
#4 BAR	20829	20829	20829	20829	48 FT
FLANGE SPOOL	4045	4038	4047	4020	1
GATE BOX PIPE	5053	5053	5042	5042	3'±
GATE BOX SLIP SLEEVE	4270	4270	4271	4271	1
JOINT RESTRAINTS					1
ASBESTOS CEMENT PIPE (ALT.)	5036	5038	5059	5065	36'±
FLG./R.T. ADAPTER X 8" (ALT.)	0125	0126	0127	0123	1
TAP GATE VALVE (R.T.) ALTERNATE	4415	4416	4417	4434	1

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

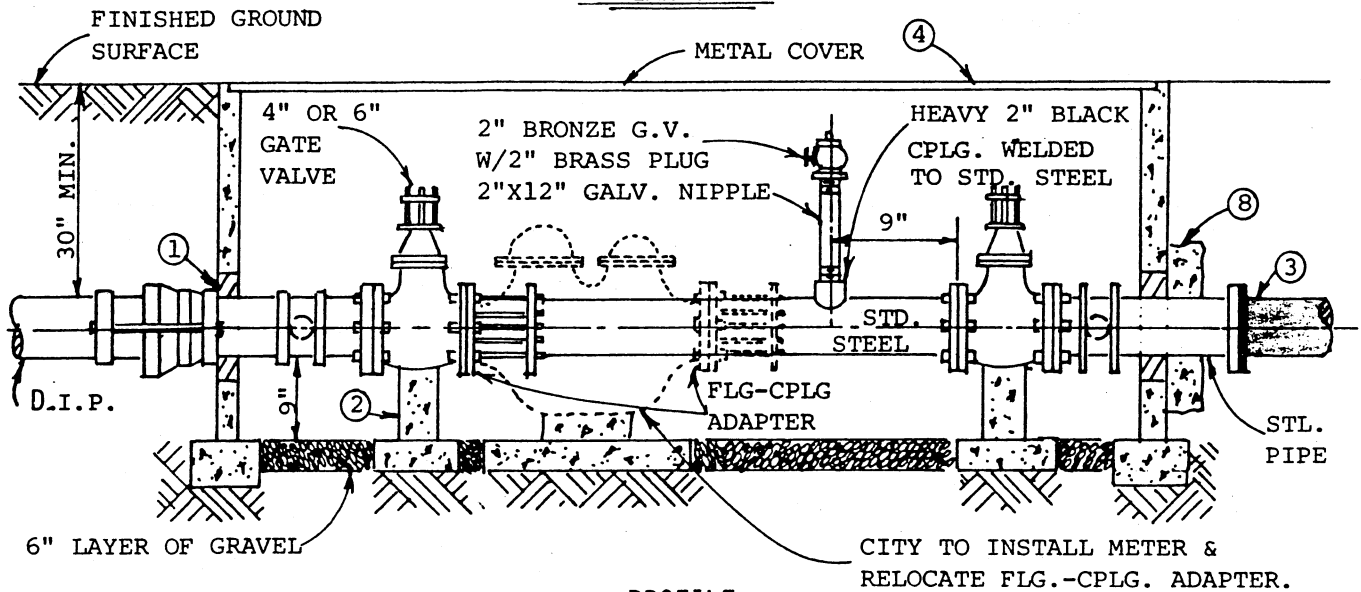
BILL OF MATERIAL FOR
FIRE SERVICE 4" THROUGH 10"

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	3/83	RSA		1	6/87	RSA		2	7/87	RSA	
Supersedes C.W.D.-610-2 OF MAY 1972											
REVISED C.I.P. TO D.I.P.											

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
O MMC	3/83	RSA	7/87	1	GJB	RSA	7/87	2	8/83	RSA	7/87
SUPERSEDES C.W.D.-620-1 OF JANUARY 1973											
REVISED NOTE 5											



PLAN VIEW



PROFILE

TYPICAL DIMENSIONS				
SERVICE SIZE	A	B	C±	D±
3"	9"	24"	29"	11"
4"	9"	29"	24"	11 1/2"
6"	10 1/2"	36 1/2"	13"	12 1/2"

⑨ SEE CWD-620-2 FOR MATERIALS CALL-OUT.

NOTES:

- ① DRY PACK PIPE OPENINGS.
- ② SUPPORT COMPOUND METER & GATES ON CONCRETE PAD WITH CONCRETE BLOCKS & WOOD SHIMS.
- ③ BY CUSTOMER FROM FLANGE END.
- ④ ADJUST VAULT & COVER TO MEET SIDEWALK & CURB GRADE. PAINT PER SECTION 310.
- ⑤ REFER TO SECTIONS 2-9, & 3.(ALL)
- ⑥ PROVIDE JOINT RESTRAINTS, "STAR SUPPLY CORP" OR APPROVED EQUAL.
- ⑦ CONTRACTOR SHALL PAINT PIPING PRIOR TO INSTALLATION OF METER.
- ⑧ POUR P.C.C. 480-C-2000 CONCRETE THRUST COLLAR AGAINST WALL OF VAULT.

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

3", 4", & 6" COMPOUND METER
WATER SERVICE

0	BR	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
		3/83	R 80		1				2			
SUPERSEDES C.W.D. - 620-2 OF SEPTEMBER 1971												

CITY OF RIVERSIDE				
BILL OF MATERIAL				
ITEM	STOCK NO.			QUAN.
	3"	4"	6"	
ADAPTER F/B-D X 18"	0114	0114	0099	1
GATE VALVE F/F	4217	4217	4220	2
D X 2" SERVICE CLAMP	0723	0723	0727	2
WELD FLANGE	N/A	4060	4005	3
2" X 12" GALV. NIPPLE	5445	5445	5445	1
4" X 3" GALV. BUSHING	0432	N/A	N/A	2
3" X 6" GALV. NIPPLE	5453	N/A	N/A	1
2" GATE VALVE - BRONZE	4204	4204	4204	3
4" SCREW FLG.	4002	N/A	N/A	2
2" PLUG	5723	5723	5723	1
COMPOUND METER	REQ.	REQ.	REQ.	1
FLANGED COUPLING ADAPTER	4706	4707	4708	1
VAULT & COVER	P E R C. W. D. - 800			1
STEEL PIPE (SCHEDULE 40)	5014	5016	5019	5'±
2" HEAVY BLACK COUP.	1542	1542	1542	1
JOINT RESTRAINT				1
3" SCREW FLG.	4001	N/A	N/A	1
GRAVEL				16 FT. ³
CONCRETE P.C.C.-480-C-2000				15 FT. ³
#4 REBAR	20829	20829	20829	48 FT.
2" BY-PASS (ALT. A)				
2" X 90° BRASS ELL SW X IPM	2710	2710	2710	2
2" COPPER PIPE, SOFT	5003	5003	5003	7'±
2" BRASS UNION	6726	6726	6726	1
2" X 3" BRASS NIPPLE	5527	5527	5527	2
2" BY-PASS (ALT. B)				
2" X 90° GALV. STREET ELL	2691	2691	2691	2
2" GALV. PIPE	5013	5013	5013	7'±
2" GALV. UNION	6709	6709	6709	1
2" X 3" GALV. NIPPLE	5441	5441	5441	2

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

BILL OF MATERIAL FOR
3", 4" & 6" COMPOUND METER WATER SERVICE

RIVERSIDE PUBLIC UTILITIES DEPT. STANDARD

DATE: MARCH 1983

C.W.D.-620-2

6' X 10' VAULT & COVER
PER C.W.D.-801

POUR THRUST BLOCK PER C.W.D.-030, AGAINST VAULT WALL
AT LEAST 6' OF STRAIGHT PIPE AT INLET

NOTCH OFF CENTER OPENING FOR PIPING

8" x 4" TEE

4" D.I.P.

4" D.I.P. BYPASS

4" GATE VALVE WITH GATE BOX PER CWD 500

4"-90° ELL

INSTALL KEYED THRUST BLOCK PER C.W.D.-030 OR JOINT RESTRAINTS PER NOTE 4 (TYP.)

8" GATE VALVE W/GATE BOX PER CWD 501

FINISHED GROUND SURFACE

DRY PACK OPENINGS

8" GATE VALVE

6" Flanged Outlet w/blind flg. & 1" Corp. Stop

12"

6"

PIPING BY CUSTOMER

METER

STL PIPE

FLG. CLPG ADAPTER

6" STD. STL. & 6" WELD FLG.

6" LAYER OF GRAVEL

SECTION A-A

GENERAL NOTES:

- 1 SUPPORT METER & GATES ON CONCRETE BLOCKS & WOOD SHIMS.
- 2 ADJUST VAULT & COVER TO MEET CURB GRADE PAINT PER SECTION 310.
- 3 SPEC. NO. 205 REF. SECT. 2-9, & 3 (ALL)
- 4 PROVIDE JOINT RESTRAINT, "STAR SUPPLY CORP" OR APPROVED EQUAL. Grease and Wrap.
- 5 CONTRACTOR SHALL INSTALL ALL PIPE, FITTINGS, & MATERIALS BETWEEN THE TAP GATE & "PIPING BY CUSTOMER", INCLUDING TEMPORARY FLG. COUPLING CONNECTION @ WATER METER LOCATION. CITY FORCES WILL FURNISH & INSTALL 8" COMPOUND METER & FAB. METER READING LID.
- 6 RINGTITE X FLANGE ADAPTER or uniflange
- 7 See CWD - 621-2 for material call - out

CITY TO INSTALL METER & RELOCATE FLG-CPLG ADAPTER

8" COMPOUND METER
WATER SERVICE

CITY OF RIVERSIDE

BILL OF MATERIAL

ITEM	STOCK #	QUANTITY
8" X 4" TEE B/B	6345	2
4" 90° ELL B/B	2656	2
4" R.W.G.V. 3'3	4208	1
4" D.I.P.	5027	16'±
8" FLG. X RINGTITE ADAPTER	0127	2
8" GATE VALVE F/F	4221	2
6" STL. PIPE	5019	1'
6" WELD FLANGE	4061	1
6" BLIND FLANGE	4027	1
1" Corp Stop IPT	1304	1
8" FLANGED CPLG. ADAPT.	4710	1
8" COMPOUND METER	REQ.	1
VAULT & COVER	PER C.W.D.-801	1
2" Joint Restraint	-	2 MIN.
8" STL. PIPE (SCHED. 40)	5020	7'±
8" WELD FLANGE	4006	1
CONCRETE P.C.C. 480-C-2000	-	20 FT. ³ ±
GRAVEL	-	28 FT. ³
#4 REBAR	20829	64'±
8" D.I.P.	5029	2
8" Gate Box Material	-	1
10" Gate Box Material	-	1
8" ACP TO D.I.P. RUBBERS	9746	4

DRAWN O	DATE 3/83	CHECK R.S.A.	APPROV. R.S.A.	REV. 1	DATE 1/24/85	CHECK NS	APPROV. NS	REV. 2	DATE 7/87	CHECK R.S.A.	APPROV. R.S.A.	REV. 3	DATE	CHECK	APPROV.
SUPERSEDES C.W.D.-621-2 OF SEPT. 1971 changed 2" test outlet to 6" Flg Added items to Bill of Material															

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

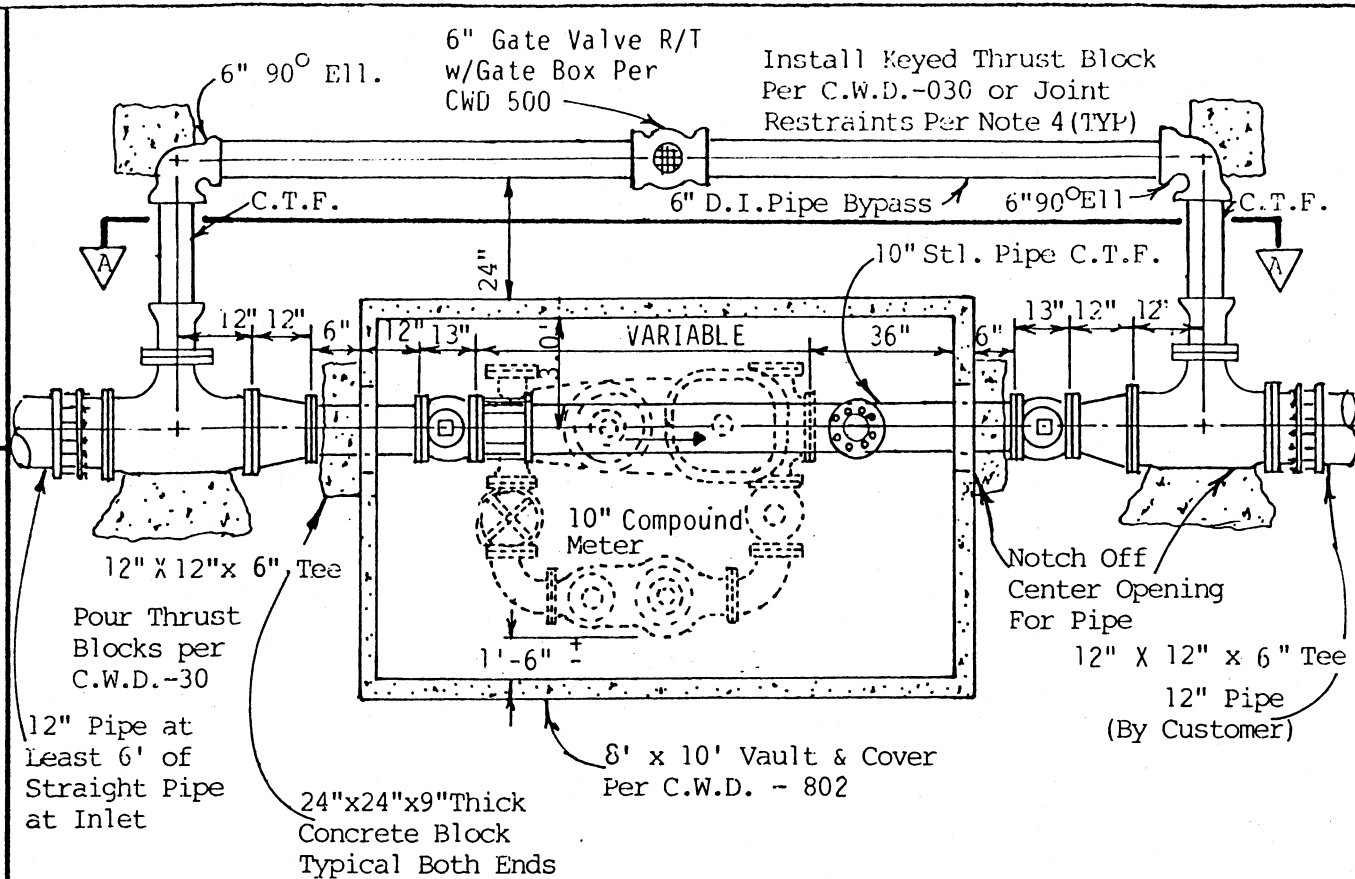
BILL OF MATERIAL
FOR 8" COMPOUND METER
WATER SERVICE

RIVERSIDE PUBLIC UTILITIES DEPT. STANDARD

DATE: MARCH 1983

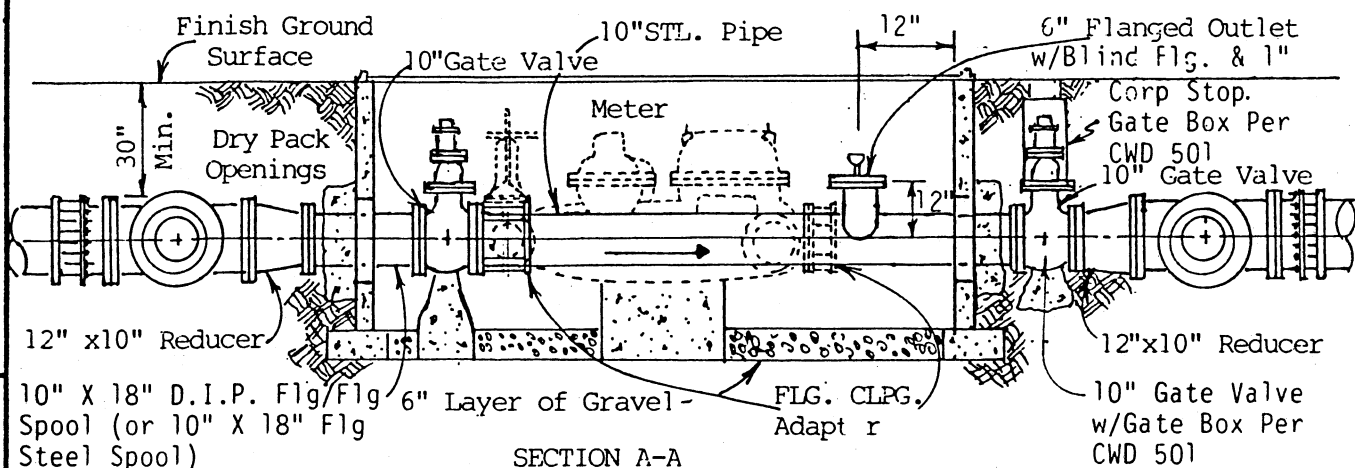
C.W.D.-621-2

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	1/22/85		JD	1	GJB	7/87		2			
REVISED VAULT PIPING &											
G.V. LOCATION											



PLAN VIEW

N.T.S.



SECTION A-A

N.T.S.

GENERAL NOTES:

- 1) Support meter & gates on concrete blocks & wood shims.
- 2) Adjust vault & cover to meet curb grade, paint per Sect. 310.
- 3) Spec. No. 205 Ref. Sect. 2-9, & 3 (All).
- 4) Provide joint restraint, "star supply Corp." or approved equal.
- 5) Provide fittings & materials between the tapping gate & "piping by customer," including temporary flg. coupling connection at water meter location. City forces will furnish & install 10" compound meter & fab. meter reading lid.
- 6) See CWD 622-2 for material call out.
- 7) Set cover flush with sidewalk.

WATER DISTRIBUTION AND TRANSMISSION CONSTRUCTION METHODS

10" COMPOUND METER
WATER SERVICE

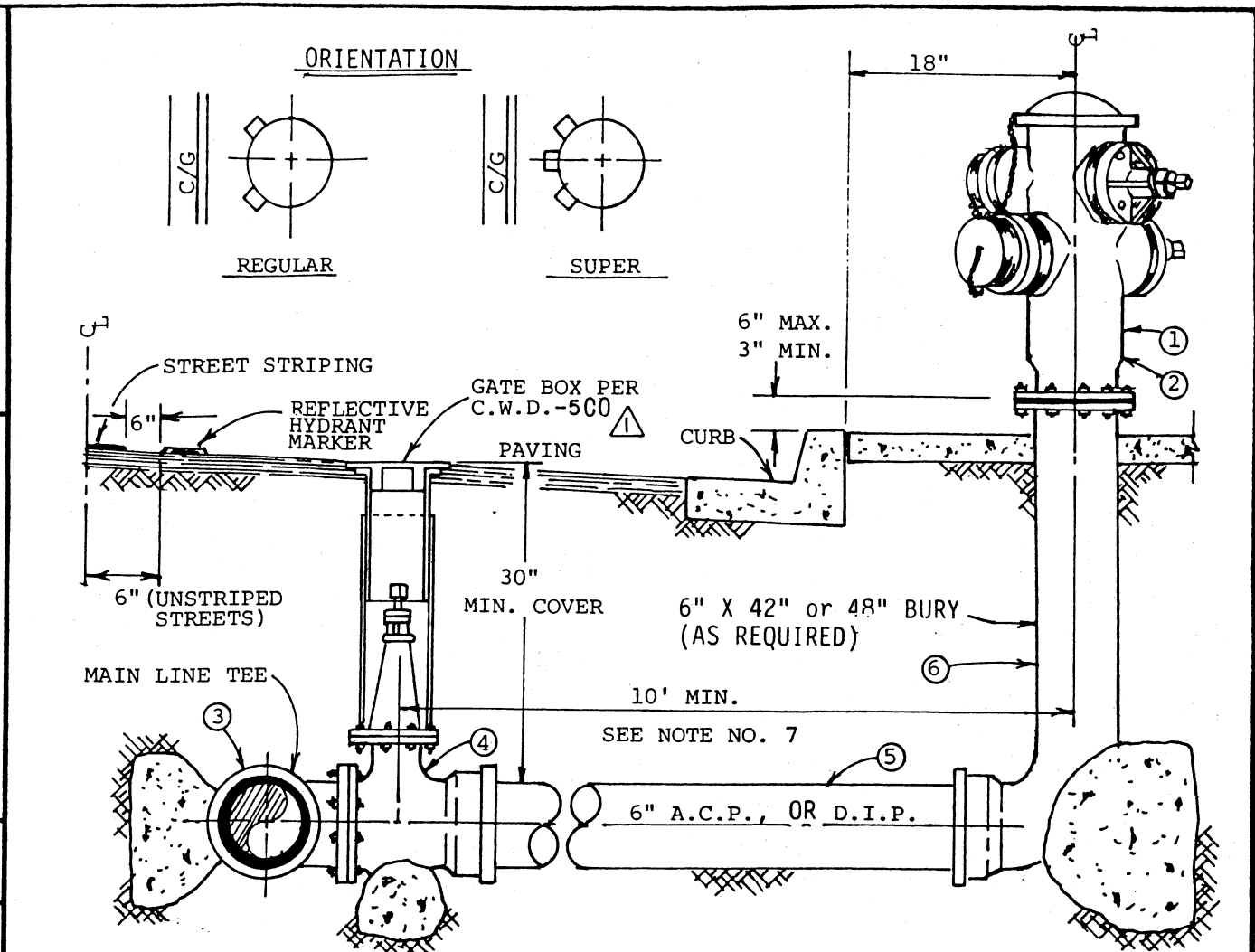
0	DRAWN GJB	DATE 7/87	CHECK RJA	APPROV. RJA	REV. 1	DATE	CHECK	APPROV.	REV. 2	DATE	CHECK	APPROV.	REV. 3	DATE	CHECK	APPROV.
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CITY OF RIVERSIDE		
BILL OF MATERIAL		
12" X 6" TEE FLG/FLG ①	-	2
6" 90° ELL R.T.	2722	2
6" R.W.G.V. B/B	4211	1
6" D.I.P.	5028	20' ±
12" X 10" REDUCER F/F	6077	2
10" GATE VALVE F/F	4254	2
12" FLG. COUPLING ADAPTER	4734	2
6" FLG. X BELL ADAPTER	0126	2
10" STL. PIPE (SCHEDULE 40)	5056	10' ±
6" STL. PIPE (SCHEDULE 40)	5054	1½' ±
10" FLANGED COUPLING ADAPTER	4733	1
10" COMPOUND METER	REQ.	1
VAULT & COVER	PER C.W.D. 802	1
10" GATE BOX MATERIAL	-	1
6" BLIND FLANGE	4027	1
6" WELD FLANGE	4005	1
CONCRETE P.C.C. 480-6-2000	-	40 ft. 3±
GRAVEL	-	40 ft. 3
#4 REBAR	20829	64' ±
1" CORP STOP IPT	1304	1
10" X 18" D.I.P. SPOOL	4033	ALTERNATE FOR STEEL
8" GATE BOX MATERIAL	-	1

① 12" X 12" TEE (FLG/FLG) WITH 12" X 6" REDUCER MAY BE USED
INSTEAD OF 12" X 12" X 6" TEE

WATER DISTRIBUTION AND TRANSMISSION CONSTRUCTION METHODS	BILL OF MATERIAL FOR 10" COMPOUND METER WATER SERVICE
RIVERSIDE PUBLIC UTILITIES DEPT. STANDARD	DATE: JULY 1987 C.W.D.-622-2

DRAWN	DATE	CHECK	APPROV.	REV.	W.E.F.	DATE	CHECK	APPROV.	REV.	GUB	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	3/83	MMC	820	1	1	4/83	3	2	7/87	3	7/87	3	3	3	7/87	3	3
SUPERSEDES C.W.D.-700 OF SEPTEMBER 1970																	
REVISED GATE BOX																	
REVISED PIPE M.I.L.																	
BURY AND NOTES																	



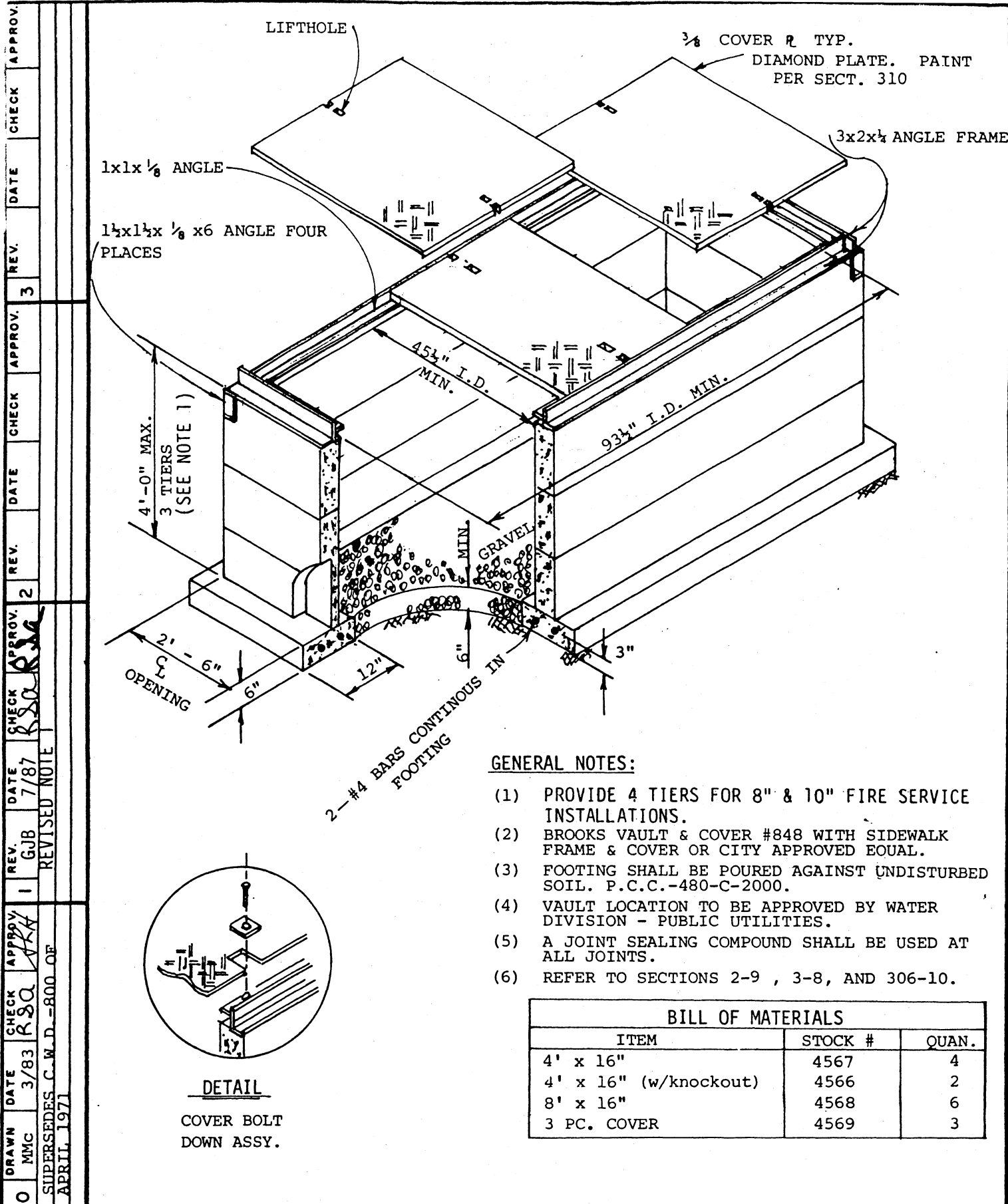
BILL OF MATERIALS			
ITEM	STOCK #	QUAN.	
① REG. HYDRANT 1-2½", 1-4"	3002		
② SUPER HYDRANT 2-2½", 1-4"	3003	1	
③ MAIN X 6" TEE B/B/F	PER W.O.	1	
④ 6" GATE VALVE F/B	4425	1	
⑤ 6" D.I.P. OR 6" A.C.P.	5028 5038	12'±	
⑥ BURY 6" X 42" OR 48"	3020, 1	1	
⑦ 8" GATE BOX CAP, GALV. SLIP SLEEVE & 12 GA. STL. PIPE	4276, 4271 & 5042	1 1'±	

GENERAL NOTES:

- SPECIFICATION NO. 205 REFERENCE, SECTIONS 2-8, 3-4, 3-7, & 306-10.
- ALTERNATE MATERIAL FOR ④ : 6" G.V. F/F (4220) & 6" ADAPTER F/B (0097).
- REG. OR SUPER HYDRANT PER THE DESIGN PLANS.
- THRUST BLOCKS PER STD. C.W.D.-030.
- BREAK-OFF BOLTS REQUIRED BETWEEN HYDRANT & BURY, CAD. PLATED OR GALV. INSTALL WITH NUT ON TOP & COUNTER BORE PACKED W/NON-OXIDE GREASE.
- BURY & HYDRANT FLG. SHALL BE 6 HOLE.
- HYDRANT VALVE SHALL BE AT LEAST 10 FEET FROM THE HYDRANT UNLESS OTHERWISE APPROVED.
- FURNISH AND INSTALL A STIMSONITE MODEL 88AB TWO WAY BLUE REFLECTIVE HYDRANT MARKER DIRECTLY OPPOSITE THE HYDRANT, LOCATE MARKER ON HYDRANT SIDE OF ST. G PER THE ABOVE DETAIL, WITH REFLECTIVE SIDE FACING ONCOMING TRAFFIC. PROVIDE 2 MARKERS FOR HYDRANTS INSTALLED @ INTERSECTIONS.

WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

REGULAR & SUPER FIRE HYDRANT
DETAIL



WATER
 DISTRIBUTION AND TRANSMISSION
 CONSTRUCTION METHODS

NON-TRAFFIC VAULT FOR 4" THRU
 10" FIRE SERVICE AND 3" THRU 6"
 COMPOUND METERS

The drawing illustrates a sidewalk vault assembly. The main view shows a rectangular vault with a diamond plate cover. Key components and dimensions include:

- LIFTHOLE**: Located on the top cover.
- COVER**: 3/8" COVER & TYP. DIAMOND PLATE. PAINT PER SECT. 310.
- ANGLE FRAME**: 3x2x1/4 ANGLE FRAME.
- ANGLE**: 1x1x1/8 ANGLE.
- PLCS**: 1 1/2 x 1 1/2 x 1/8 x6 ANGLE 4 PLCS.
- I.D. MIN.**: 69 1/2" I.D. MIN. and 117 1/2" I.D. MIN.
- GRAVEL**: MIN. GRAVEL layer at the base.
- FOOTING**: 2-#4 BARS CONTINUOUS IN FOOTING.
- Tiers**: 4' - 0" MAX 3 TIERS.
- Dimensions**: 6" width at base, 12" depth at base, 3" gap between tiers.

GENERAL NOTES:

- (1) BROOKS VAULT & COVER #8610 WITH SIDEWALK FRAME AND COVER OR CITY APPROVED EQUAL.
- (2) FOOTING SHALL BE POURED AGAINST UNDISTURBED SOIL. P.C.C.-480-C-2000.
- (3) VAULT LOCATION TO BE APPROVED BY WATER DIVISION — PUBLIC UTILITIES.
- (4) A JOINT SEALING COMPOUND SHALL BE USED AT ALL JOINTS.
- (5) MORE THAN 3 TIERS FOR VAULT MUST HAVE CITY APPROVAL.
- (6) REFER TO SECTIONS 2-9 , 3-8, and 306-10.

BILL OF MATERIALS

ITEM	STOCK #	QUAN.
6' x 16"	4570	6
10' x 16"	4571	6
4 PC. COVER	4572	4

DETAIL

COVER BOLT DOWN ASSY

NON-TRAFFIC VAULT FOR 8" COMPOUND METERS

0	DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
	GJB	7/87			1				2			
									3			

COVER BOLT DOWN ASSEMBLY TYP.

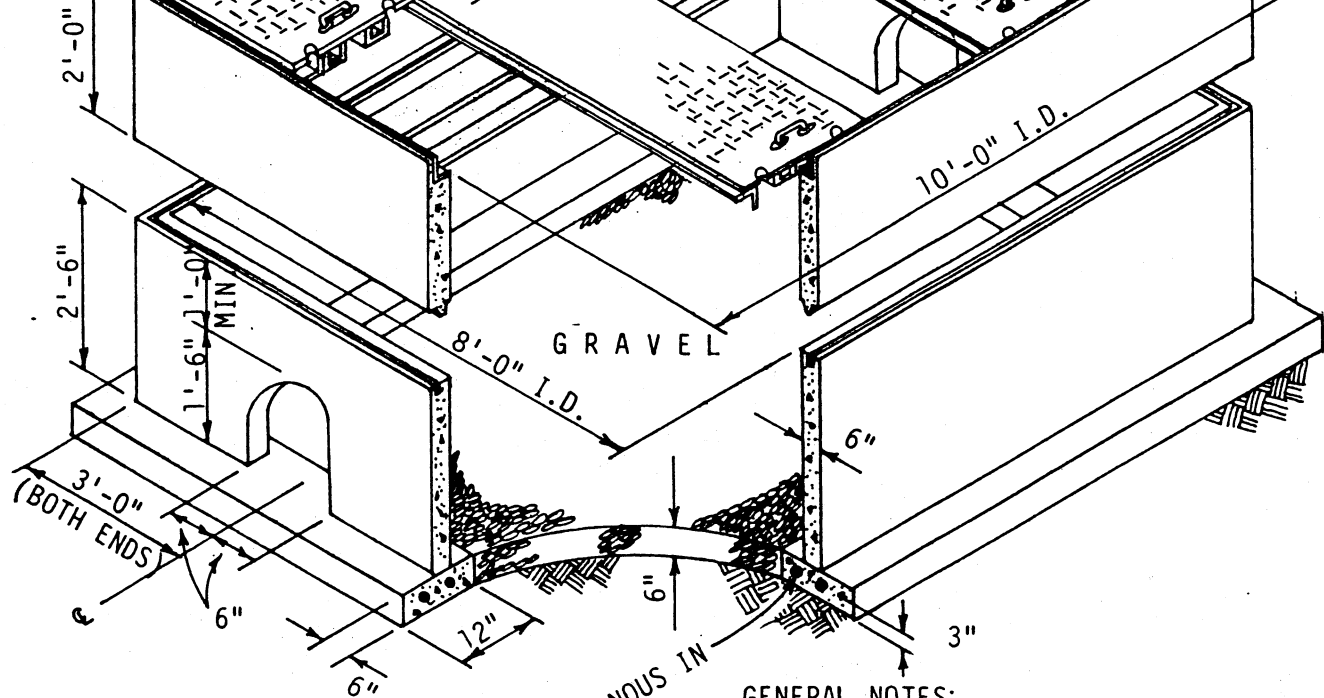
3/16" DIAMOND PLATE
COVER TYP. PAINT
PER SECT. 310

RETRACTABLE HANDLE
TYP.

STIFFENERS AS REQUIRED

REMOVABLE W 6 X 9 BEAM
W/1/4" X 3-1/8" X 6-1/8"
BEARING PLATE

3" X 3" X 3/8"
ANGLE WITH
ANCHORS

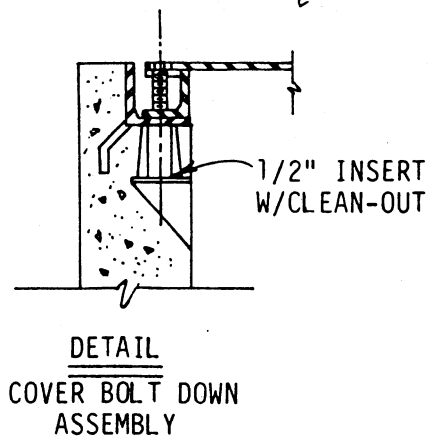


GENERAL NOTES:

- (1) QUIKSET C OF R 8' X 10' VAULT WITH SIDEWALK FRAME AND COVER OR CITY APPROVED EQUAL.
- (2) FOOTING SHALL BE POURED AGAINST UNDISTURBED SOIL. P.C.C.-480-C-2000.
- (3) VAULT LOCATION TO BE APPROVED BY WATER DIVISION -- PUBLIC UTILITIES.
- (4) A JOINT SEALING COMPOUND SHALL BE USED AT ALL JOINTS.
- (5) REFER TO SECTIONS 2-9, 3-8, and 306-10.

BILL OF MATERIALS

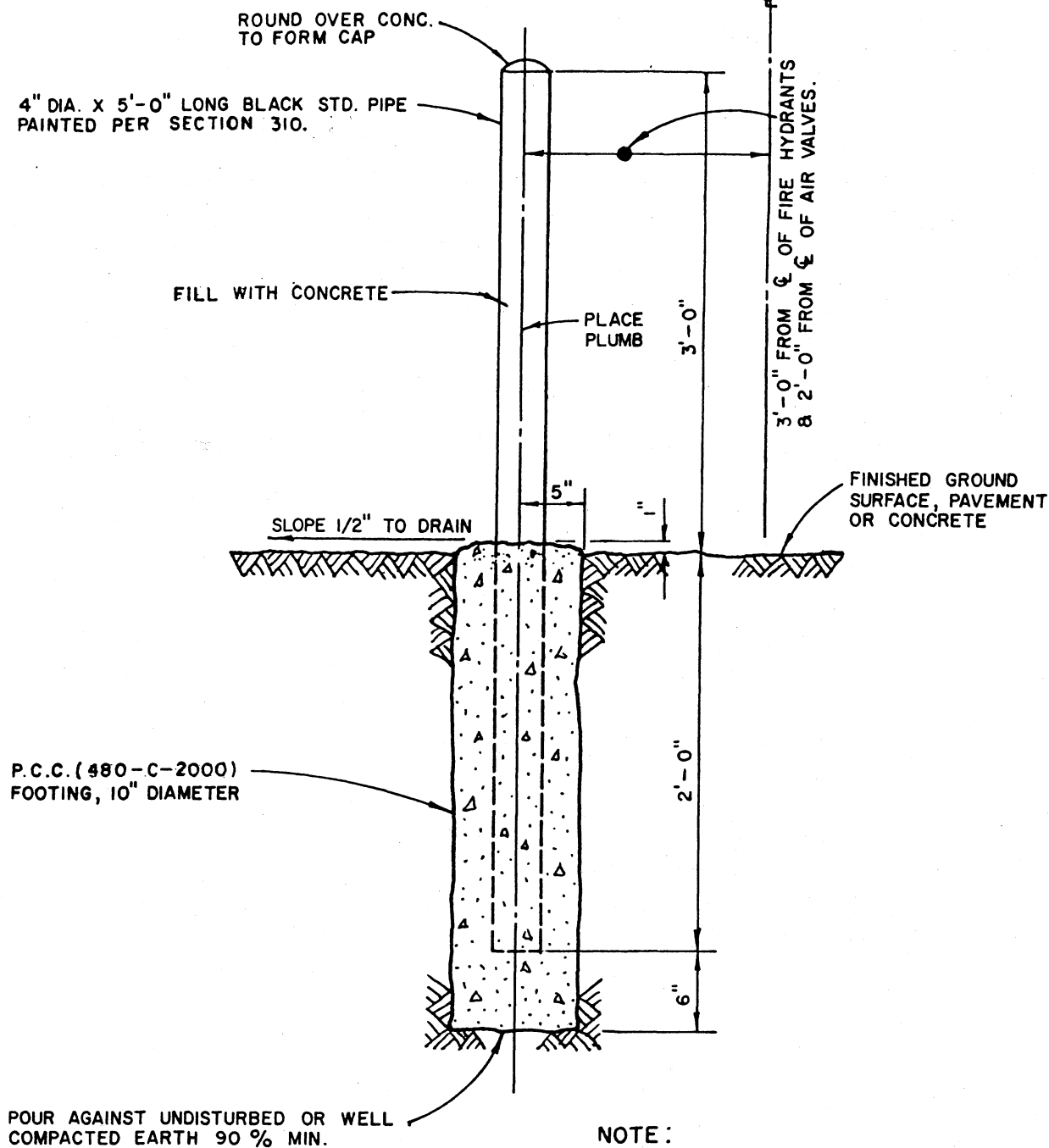
ITEM	QUANTITY
8' X 10' X 24" TIER	1
8' X 10' X 30" TIER	1
5 PIECE COVER	5
W 6 X 9 X 10.5' BEAM	1



WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

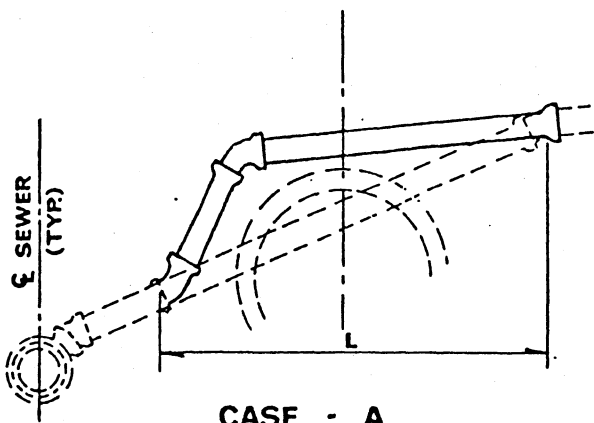
NON-TRAFFIC VAULT FOR
10" COMPOUND METERS

DRAWN	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.	REV.	DATE	CHECK	APPROV.
0	D.T.	10/70	F.L.	1	1/81	2	3/83	3			
SUPERCEDES DI-2733-C6											
UPDATED.											
REVISED PIPE FROM 5'-6" TO 5' AND ADDED NOTE 2.											

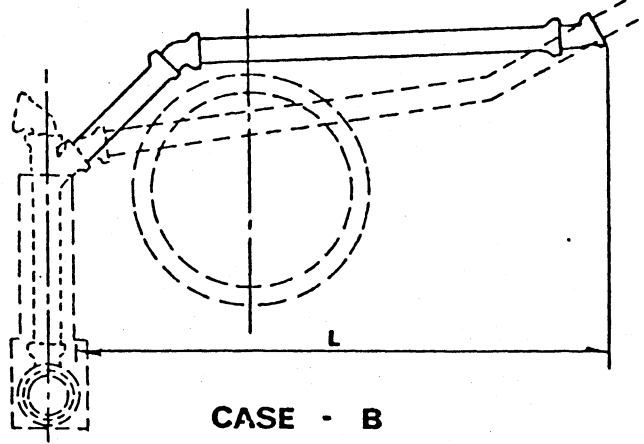


WATER
DISTRIBUTION AND TRANSMISSION
CONSTRUCTION METHODS

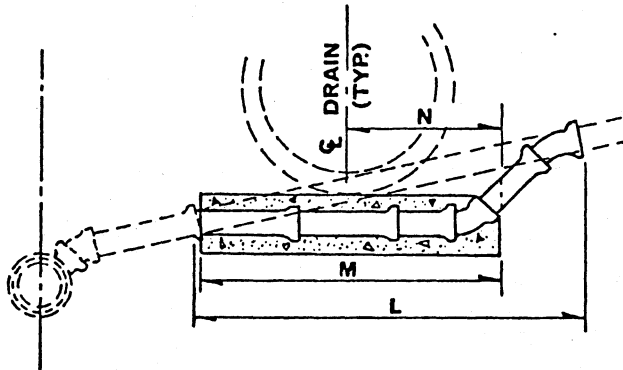
STANDARD GUARD POST INSTALLATION



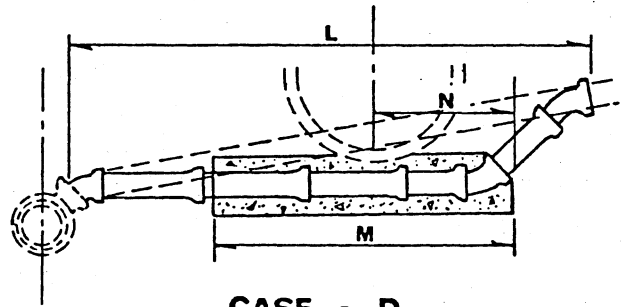
CASE - A



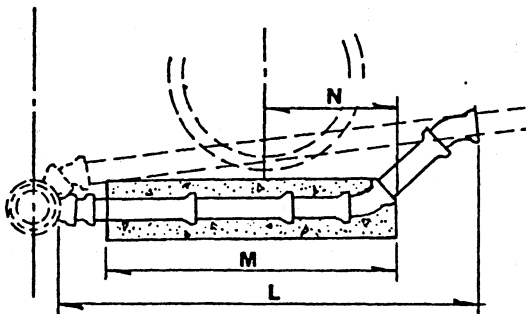
CASE - B



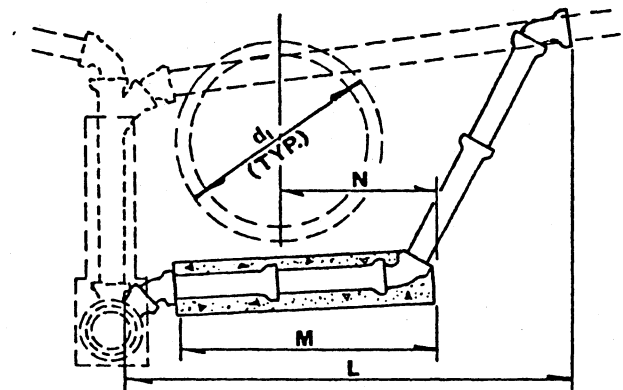
CASE - C



CASE - D



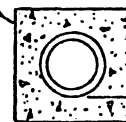
CASE - E



CASE - F

SEE SHEET 2 FOR NOTES AND
DESCRIPTION OF CASES

Class 420-C-2000
concrete encasement



4" (typ.)

CROSS SECTION OF CONCRETE
REINFORCEMENT FOR PIPE.

APPROVED Robert C. Wala DATE 4/29/78
W.R. PUBLIC WORKS DIRECTOR - R.C.E. 18793

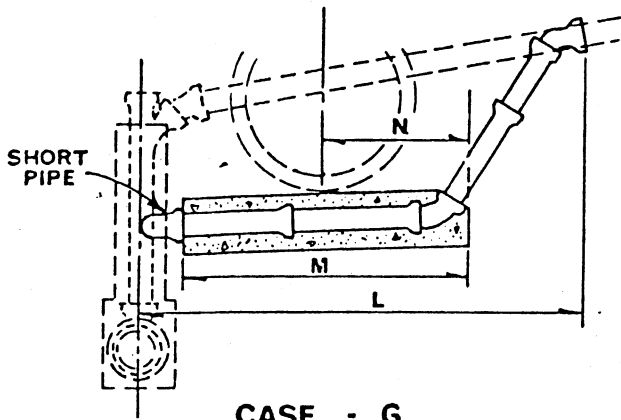
CITY OF RIVERSIDE
PUBLIC WORKS DEPT. - ENGINEERING DIV.

REMODELING DETAILS
FOR SEWER LATERALS

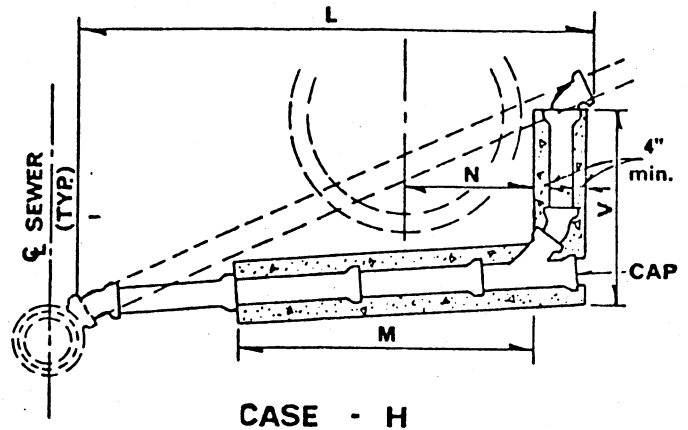
STANDARD DRAWING NO.

554
Sheet 1 of 2

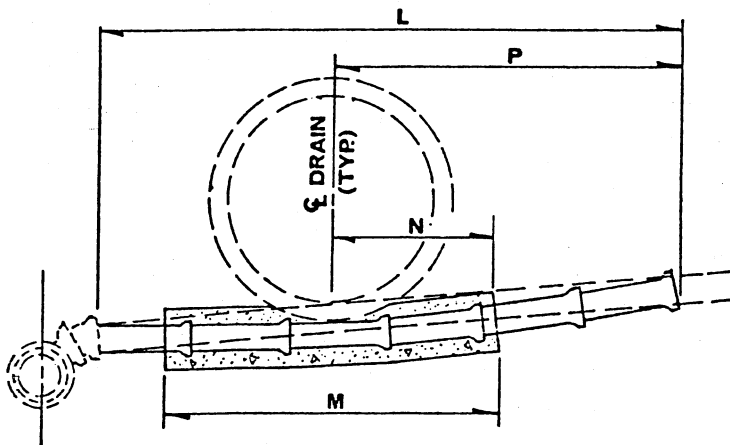
MARK	REVISIONS	APPR.	DATE



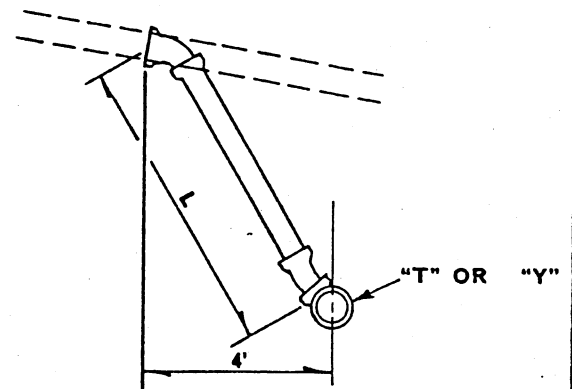
CASE - G



CASE - H



CASE - K



CASE - R

NOTES:

- These details do not apply to conflicts between sewer laterals and water lines.
- Existing pipes are indicated by broken lines.
- Pipes to be constructed are indicated by solid lines.
- All pipe diameters shall match existing lateral.
- All bends shall be $\frac{1}{8}$ bends unless specified otherwise.
- Concrete reinforcement, cross section shown on sheet 1, shall be used on all pipes to be constructed under storm drain, top portion within 1" of storm drain to be omitted.
- Dimensions:
 - L is specified on plan as the average total length.
 - M = $(d_1 + 24")$ less enough to avoid a fraction of a foot.
 - N $\frac{1}{2}$ M, except where specified otherwise on plan.
 - P (case K) is specified where L does not extend to the bend.
 - V₁ (case H) is specified to the nearest foot and in summary, is itemized as Concrete Reinforcement for 6" pipe.
- New connection to main line shall conform to standard drawing no. 562.
- Joints shall be type D, F, or G per the latest approved edition of Standard Specifications for Public Works Construction.

CASES:

- Above Drain to House Connection - Specials required: 2 $\frac{1}{8}$ Bends.
- Above Drain to Chimney - 2 $\frac{1}{8}$ Bends.
- Below Drain to House Connection - 2 $\frac{1}{8}$ Bends.
- Below Drain to "Y" - 3 $\frac{1}{8}$ Bends.
- Below Drain to Flat Saddle - 3 $\frac{1}{8}$ Bends, 1 Saddle.
- Below Drain to Saddle - 3 $\frac{1}{8}$ Bends, 1 Saddle.
- Below Drain to Chimney - 2 $\frac{1}{8}$ Bends.
- Below Drain to "Y" - 3 $\frac{1}{8}$ Bends, 1 "Y".
- Below Drain to House Connection, Slope slightly modified.
- Connection with New Sewer - 2 $\frac{1}{8}$ Bends with "Y".
- 1 $\frac{1}{4}$ Bend with "T".

APPROVED

Robert C. White DATE 6/28/78
PUBLIC WORKS DIRECTOR - R.C.E. 18793

CITY OF RIVERSIDE
PUBLIC WORKS DEPT. - ENGINEERING DIV.

REMODELING DETAILS
FOR SEWER LATERALS

STANDARD DRAWING NO.

554

SIGN STANDARD

TRAFFIC CONTROL SIGNS FOR CONSTRUCTION PROJECTS

All traffic control signs shall conform to the current State of California, UNIFORM SIGN CHART. (The minimum-sized sign is allowed.)

Sign Blank: Blank material shall be made of either aluminum, steel or high density plywood.

Sign Color: All sign colors shall be reflectorized, conforming to the following requirements:

Yellow & Orange Signs: Reflective sheeting material shall be used for background color. Legend color shall be black and affixed to sheeting material either through the process of silk screening or non-reflective cut-out letters, symbols and borders.

Silver Signs: Reflective silver (white) sheeting material shall be used for background color. Legend color shall be black and affixed to background as described above for yellow signs.

Red Signs: Reflective red sheeting material shall be used for background color if reflectorized silver (white) cut-out letter and borders are utilized. Silver (white) reflective sheeting shall be used for silk screening in which the process will be reversed to produce a red background with silver (white) legend.

Black Signs: Non-reflective black background color. Legend color shall be reflective silver (white) and affixed to background either through the process of silk screening or reflective cut-out letters, numbers, symbols and borders. Non-reflective borders may be used only if sign is larger than 4' x 5' or (20 sq. ft.).

Green Signs: Non-reflective green background. Legend color shall be reflective silver (white) and affixed to background as described above for black signs.

Legend: Letters, numbers, symbols, borders, size and stroke shall conform to the State of California, Caltrans, standard sign lay-out specifications.

THE CONTRACTOR MUST OBTAIN WRITTEN APPROVAL FROM THE TRAFFIC ENGINEER PRIOR TO VARIANCES FROM THE ABOVE STANDARDS.

△ Revised 5/16/73 ~~ADP~~
△ REVISED 06-77 5

Approved by [Signature]
City Traffic Engineer

Date 5/18/76

CONSTRUCTION SIGNS

PARKING & TRAFFIC DIV., CITY OF RIV, CALIF

STANDARD DRWG. NO. 658

